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[1)]Finnish Environment Institute, Laboratory Centre
[2)]KVVY Tutkimus Oy, Tampere, Finland

Helsinki 2018
Finnish Environment Institute

REPORTS OF THE FINNISH ENVIRONMENT INSTITUTE 18 | 2018
Finnish Environment Institute SYKE
Proftest SYKE

Layout: Markku Ilmakunnas

The publication is also available in the Internet: www.syke.fi/publication | helda.helsinki.fi/syke

ISBN 978-952-11-4949-8 (pbk.)
ISBN 978-952-11-4950-4 (PDF)
ISSN 1796-1718 (print)
ISSN 1796-1726 (Online)

Author(s): Riitta Koivikko, Mirja Leivuori, Marika Kaasalainen, Keijo Tervonen, Sari Lanteri and Markku Ilmakunnas

Publisher and financier of publication: Finnish Environment Institute (SYKE)
P.O. Box 140, FI-00251 Helsinki, Finland, Phone +358 295 251 000, syke.fi.

Year of issue: 2018

SYKE

ABSTRACT

Interlaboratory Proficiency Test 14/2017

Proftest SYKE carried out the proficiency test in cooperation with the KVVY Tutkimus Oy for the laboratories conducting leaching tests for solid waste samples at the turn of the year 2017-2018. The results of the up-flow percolation test (EN 14405:2017) for fly ash samples were compared and evaluated. In total, 8 participants joined in the proficiency test.

Either the mean or the median of the results reported by the participants was used as the assigned value for the measurands. The overall performance evaluation was done with the E_n scores and 64 % of the all the evaluated results were satisfactory. The performance evaluation for the results for pH as well as for the cumulative values L/S 2 and L/S 10 of the measurands was done also with the z scores. In the evaluation based on z scores, 85 % of the results were satisfactory, when deviation was set to 0.5 pH units, to 20 % for SO_4 and to 50 % for other measurands. For these same results, 78 % of the results were satisfactory when evaluated with the E_n scores.
Warm thanks to all the participants!

Keywords: leaching test, up-flow percolation, waste landfill acceptance criteria, environmental laboratories, proficiency test, interlaboratory comparison

TIIVISTELMÄ

Laboratorioiden välinen pätevyyskoe 14/2017

Proftest SYKE järjesti yhteistyössä KVVY Tutkimus Oy:n kanssa pätevyyskokeen vuodenvaihteessa 2017-2018 laboratorioille, jotka tekevät liukoisuustestejä jätteiden kaatopaikkakelpoisuuden arvioimiseksi. Pätevyyskokeessa vertailun kohteena oli läpivirtaustesti (EN 14405:2017). Pätevyyskokeessa oli yhteensä 8 osallistujaa.

Testisuureen vertailuarvona käytettiin osallistujien tulosten keskiarvoa tai mediaania. Pätevyyden arviointi tehtiin tässä vertailussa koko aineistolle E_n-arvoilla ja 64 % arvioiduista tuloksista oli hyväksyttäviä. Lisäksi pätevyyden arviointi tehtiin z-arvoilla kumulatiivisten arvojen L/S 2 ja L/S 10 sekä pH määritysten tuloksille. Tuloksista, jotka arvioitiin z-arvoilla, 85 % oli hyväksyttäviä kun vertailuarvosta sallittiin pH-määrityksissä 0,5 pH-yksikön, SO_4-määrityksissä 20 % ja muilla testisuureilla 50 % poikkeama. Näistä tuloksista 78 % oli hyväksyttäviä E_n-arvoilla arvioituna.
Kiitos osallistujille!

Avainsanat: liukoisuustesti, läpivirtaustesti, kaatopaikkakelpoisuus, ympäristölaboratoriot, pätevyyskoe, laboratorioiden välinen vertailumittaus

SAMMANDRAG

Provningsjämförelse 14/2017

Proftest SYKE genomförde i samarbete med föreningen KVVY Tutkimus OY en provningsjämförelse i årsskiftet 2017-2018 för laktester som används vid bedömningen av avfall som ska deponeras på deponi. Resultaten av uppströms perkolationstest (EN 14405:2017) för flygaska jämfördes och värderades. Sammanlagt 8 laboratorier deltog i proven.

Som referensvärde för analytens koncentration användes medelvärdet eller medianen av deltagarnas resultat. Resultaten värderades med hjälp av E_n och z-värden. I jämförelsen var 64 % av alla resultaten tillfredsställande, när resultaten värderades med E_n-värden. De kumulativa resultaten L/S 2 och L/S 10 och pH värderades också med z-värden. Av dessa resultat, var 85 % tillfredsställande när en totalavvikelse från referensvärdet på 0,5 pH-enheter, 20 % (SO_4) eller 50 % (alla de andra analyterna) accepterades. För samma resultat var 78 % tillfredsställande när de värderade med E_n-värden.
Ett varmt tack till alla deltagarna!

Nyckelord: laktest, uppströms perkolationstest, klassificering av avfall för deponi, miljölaboratorier, provningsjämförelse, kompetensprövning

CONTENTS

1 Introduction

Proftest SYKE carried out the proficiency test (PT) in cooperation with the KVVY Tutkimus Oy for the laboratories conducting leaching tests for solid waste sample at the turn of the year 2017–2018 (LT 14/2017). In this proficiency test, the results of the up-flow percolation test (EN 14405:2017) for fly ash samples were compared and evaluated. The up-flow percolation test is used as a compliance test in evaluation the waste landfill disposal. The tested measurands were metals (As, Ba, Cd, Cr, Cu, Hg, Mo, Ni, Pb, Sb, Se, V, Zn), Cl^-, SO_4^{2-}, F^-, DOC, pH, and conductivity.

Finnish Environment Institute (SYKE) is appointed National Reference Laboratory in the environmental sector in Finland. The duties of the reference laboratory include providing interlaboratory proficiency tests and other comparisons for analytical laboratories and other producers of environmental information. This proficiency test has been carried out under the scope of the SYKE reference laboratory and it provides an external quality evaluation between laboratory results, and mutual comparability of analytical reliability. The proficiency test was carried out in accordance with the international guidelines ISO/IEC 17043 [1], ISO 13528 [2] and IUPAC Technical report [3]. The Proftest SYKE is accredited by the Finnish Accreditation Service as a proficiency testing provider (PT01, ISO/IEC 17043, www.finas.fi/sites/en). The organizing of this proficiency test is not yet included in the accreditation scope of the Proftest SYKE. The test follows the procedures of the accredited schemes and will be included in the accreditation scope in the future.

2 Organizing the proficiency test

2.1 Responsibilities

Provider

Proftest SYKE, Finnish Environment Institute (SYKE), Laboratory Centre
Ultramariinikuja 4 (formerly Hakuninmaantie 6), FI-00430 Helsinki, Finland
Phone: +358 295 251 000, email: proftest@environment.fi

The responsibilities in organizing the proficiency test

Riitta Koivikko	coordinator
Mirja Leivuori	substitute for coordinator
Keijo Tervonen	technical assistance
Markku Ilmakunnas	technical assistance
Sari Lanteri	technical assistance
Ritva Väisänen	technical assistance

Cooperation partner	KVVY Tutkimus Oy (T064, www.finas.fi/sites/en) Sirpa Väntsi, Director of Laboratory

	Analytical experts (KVVY Tutkimus Oy): Marika Kaasalainen: up-flow percolation test Raija Ivalo: pH and conductivity Riikka Mattsson: anions (IC), DOC Suvi Pöyhönen: metals (ICP-OES and ICP-MS)
Subcontracting	KVVY Tutkimus Oy: Sample material preparation: homogenization and dividing into sub-samples, leaching test (pretest, homogeneity) and the needed chemical and physico-chemical analysis

2.2 Participants

In total 8 laboratories participated in this proficiency test, 4 participants were from Finland, and 4 from abroad (Appendix 1). Altogether 75 % of the participants used accredited analytical methods at least for a part of the measurements. For this proficiency test, the organizing laboratory (T064, www.finas.fi/sites/en) has the code 9 (KVVY) in the result tables.

2.3 Samples and delivery

A fly ash sample (LT1, about 600 g) was delivered to the participants. The test material was fly ash from the combustion of coal, peat and wood mixture material from Southern Finland. This waste is included in the scopes of the Government Decree 591/2006 and the Government Decree 843/2017 [4, 5]. The sample material was air dried, sieved and homogenized prior to dividing into sub samples. Particle size was < 4 mm according to the EN 14405:2017 [6].

The measurands were requested to be determined from the test fractions 1-7. Also cumulative values L/S 2 and L/S 10 were requested to be reported. The used sample codes in the results tables are:

LT1F1 = Sample LT1, Fraction 1
LT1F2 = Sample LT1, Fraction 2
LT1F3 = Sample LT1, Fraction 3
LT1F4 = Sample LT1, Fraction 4
LT1F5 = Sample LT1, Fraction 5
LT1F6 = Sample LT1, Fraction 6
LT1F7 = Sample LT1, Fraction 7
LT1LS_2 = Sample LT1, L/S 2
LT1LS10 = Sample LT1, L/S 10

For reporting the cumulative values, the following note was given: If the result in one or more eluate fraction is below the limit of detection, the cumulative results should be reported with upper and lower limit values. These values were requested to be reported on the results sheet.

The samples were delivered on 18 December 2017 to the participants abroad and on 19 December 2017 to the national participants. The samples arrived to the participants latest on 20 December 2017.

The samples were requested to be kept at room temperature in a dry place and protected from light. The up-flow percolation test was requested to be conducted latest on 23 February 2018.

The results were requested to be reported latest on 7 March 2018 and all the participants reported the results accordingly. The preliminary results were delivered to the participants via ProftestWEB and email on 16 March 2018.

2.4 Pretesting and homogeneity

The material suitability for up-flow percolation test was tested by conducting the up-flow percolation test and analyzing all the measurands prior dividing into subsamples.

The homogeneity of the samples was tested by analyzing total metal concentrations of As, Ba, Cr, Mo, Pb, Se, and Zn. More detailed information of homogeneity studies is shown in Appendix 2. According to the homogeneity test results, the samples were considered homogenous.

2.5 Feedback from the proficiency test

The feedback from the proficiency test is shown in Appendix 3. The comments from the participants dealt with e.g. sample delivery, the test material and the results reporting. All the feedback is valuable and is exploited when improving the activities.

2.6 Processing the data

2.6.1 Pretesting the data

The normality of the data was tested by the Kolmogorov-Smirnov test. The outliers were rejected according to the Grubbs or Hampel test before calculating the mean. The results which differed from the data more than $s_{rob} \times 5$ or 50 % from the mean were rejected before the statistical results handling. If the result has been reported as below detection limit, it has not been included in the statistical calculations.

More information about the statistical handling of the data is available from the Guide for participant [7].

2.6.2 Assigned values

The assigned values and their uncertainties are presented in Appendix 6.

For all the measurands and fractions the mean or median of the results reported by the participants was used as the assigned value. The expanded uncertainty of the assigned value was calculated using the standard deviation of the reported results [2, 7]. The assigned values based on the mean or the median are not metrologically traceable values. As it was not possible to have metrologically traceable assigned values, the best available values were selected to be used as the assigned values. The reliability of the assigned value was statistically tested [2, 3].

Due to low leachability the variation of the results was very high or the number of results was very low for some fractions of As, Cd, Cu, F, Mo, Pb, Sb, Se, and Zn and, thus, the assigned value was not set for such fractions and no performance evaluation is done.

For Hg and Ni the leachability was very low and for many participants close to or below detection limit of quantification/detection. No assigned value was set for these measurands and, thus, no performance evaluation is given.

When using the mean or the median of the participant results as the assigned value, the uncertainties of the assigned values varied between 1.4 % and 96 % (Appendix 4). For the measurands evaluated with E_n scores the uncertainties varied from 3.7 % to 96 % and for the ones evaluated with z scores the uncertainties varied between 1.4 % and 59 % (Appendix 4).

2.6.3 Standard deviation for proficiency assessment and results' evaluation

In this proficiency test, the overall performance evaluation was done by means of E_n scores ('*Error, normalized*'). The evaluation is done with E_n scores when the assigned value and the uncertainty of the assigned value were set. These are used to evaluate the difference between the assigned value and participant's result within their claimed expanded uncertainty. E_n scores are calculated:

$$(E_n)_i = \frac{x_i - x_{pt}}{\sqrt{U_i^2 + U_{pt}^2}}, \text{ where}$$

x_i = participant's result, x_{pt} = assigned value, U_i = the expanded uncertainty of a participant's result and U_{pt} = the expanded uncertainty of the assigned value.

Scores of E_n $-1.0 < E_n < 1.0$ should be taken as an indicator of successful performance when the uncertainties are valid. Whereas scores $E_n \geq 1.0$ or $E_n \leq -1.0$ could indicate a need to review the uncertainty estimates, or to correct a measurement issue. **E_n scores are not given when the participant has not reported uncertainties with their results.**

Further, the results for pH as well as for the cumulative values L/S 2 and L/S 10 were evaluated also with the z scores. The standard deviation for proficiency assessment was estimated on the basis of the uncertainty of the assigned values, the concentrations of the measurands, and the results of homogeneity tests. If the number of reported results was low ($n<6$) or the deviation of the results was very high, the assigned value or the total standard deviation are not set, and the proficiency estimation as z scores is not given. *Due to the nature of this test the z scores are given for L/S 2 and L/S 10 in some cases where n(stat)=5 and sd% <40 (Cu (only L/S 10), Pb, SO_4).* The standard deviation for proficiency assessment ($2\times s_{pt}$ at the 95 % confidence level) was set to 0.5 pH units, to 20 % for SO_4 and to 50 % for other measurands.

When using the mean or the median as the assigned value, the reliability was tested according to the criterion $u_{pt} / s_{pt} \leq 0.3$, where u_{pt} is the standard uncertainty of the assigned value (the expanded uncertainty of the assigned value (U_{pt}) divided by 2) and s_{pt} is the standard deviation for proficiency assessment [3].

The reliability of the standard deviation and the corresponding z score was estimated by comparing the deviation for proficiency assessment (s_{pt}) with the standard deviation (sd) of the reported results (the criteria sd / s_{pt} < 1.2) [3].

Only some of the measurands were evaluated based on z scores and in each case the above mentioned criterion were not met and, therefore, the evaluation of the performance is weakened in this proficiency test.

3 Results and conclusions

3.1 Results

The terms used in the results tables are shown in Appendix 5. The results and the performance of each participant are presented in Appendix 6 and the summary of the results in Table 1. The summary of the E_n scores is shown in Appendix 7, the summary of the z scores in Appendix 8 and z scores in the ascending order in Appendix 9.

Table 1. The summary of the results in the proficiency test LT 14/2017.

Measurand	Sample	Unit	Assigned value	Mean	Rob. mean	Median	sd	sd %	s_{rob}	s_{rob} %	2 x s_{pt} %	n (all)	Acc E_n %	Acc z %
As	LT1F1	mg/kg	0.31	0.31		0.26	0.14	45.7			-	6	60	-
	LT1F2	mg/kg	0.066	0.096		0.066	0.074	76.7			-	7	50	-
	LT1F3	mg/kg	0.11	0.10		0.11	0.05	46.9			-	7	57	-
	LT1F4	mg/kg	0.013	0.017		0.013	0.016	96.3			-	7	50	-
	LT1F5	mg/kg		0.005		0.005	0.005	98.5			-	7	-	-
	LT1F6	mg/kg		0.02		0.02	0.02	141.3			-	8	-	-
	LT1F7	mg/kg		0.02		0.02	0.04	141.7			-	8	-	-
	LT1LS_2	mg/kg	0.46	0.49		0.46	0.20	40.4			50	6	83	50
	LT1LS10	mg/kg	0.50	0.50		0.50	0.20	39.4			50	6	83	83
Ba	LT1F1	mg/kg	0.15	0.16		0.15	0.08	49.0			-	6	83	-
	LT1F2	mg/kg	0.11	0.12		0.11	0.08	68.0			-	7	67	-
	LT1F3	mg/kg	0.21	0.25	0.25	0.21	0.10	42.4	0.12	48.1	-	7	71	-
	LT1F4	mg/kg	0.14	0.14		0.14	0.06	44.8			-	7	71	-
	LT1F5	mg/kg	0.18	0.19		0.18	0.15	76.2			-	7	14	-
	LT1F6	mg/kg	0.75	0.92	0.88	0.75	0.46	49.7	0.41	47.1	-	8	71	-
	LT1F7	mg/kg	3.01	2.54	2.54	3.01	1.02	40.1	1.15	45.4	-	8	71	-
	LT1LS_2	mg/kg	0.92	0.86		0.92	0.22	26.1			50	6	83	83
	LT1LS10	mg/kg	5.12	4.75		5.12	1.23	25.9			50	6	83	100
Cd	LT1F1	mg/kg	0.0008	0.0008		0.0008	0.0005	59.2			-	6	60	-
	LT1F2	mg/kg	0.0009	0.0008		0.0009	0.0005	58.8			-	7	60	-
	LT1F3	mg/kg	0.0006	0.0009		0.0006	0.0006	60.3			-	7	50	-
	LT1F4	mg/kg		0.003		0.002	0.004	126.8			-	7	-	-
	LT1F5	mg/kg		0.003		0.000	0.004	163.6			-	7	-	-
	LT1F6	mg/kg		0.0029		0.0009	0.0043	147.0			-	8	-	-
	LT1F7	mg/kg		0.003		0.002	0.004	124.6			-	8	-	-
	LT1LS_2	mg/kg	0.004	0.004		0.003	0.002	51.1			-	6	100	-
	LT1LS10	mg/kg		0.005		0.005	0.004	78.8			-	6	-	-

Table 1. The summary of the results in the proficiency test LT 14/2017.

Measurand	Sample	Unit	Assigned value	Mean	Rob. mean	Median	sd	sd %	s_{rob}	s_{rob} %	2 x s_{pt} %	n (all)	Acc E_n %	Acc z %
Cl	LT1F1	mg/kg	1233	1078		1233	530	49.2			-	6	83	-
	LT1F2	mg/kg	617	469		617	307	65.5			-	7	50	-
	LT1F3	mg/kg	217	271		217	163	59.9			-	7	43	-
	LT1F4	mg/kg	19.6	21.9		19.6	14.1	64.4			-	7	43	-
	LT1F5	mg/kg	4.80	4.49		4.80	2.10	46.8			-	7	50	-
	LT1F6	mg/kg	2.77	3.64		2.77	2.46	67.6			-	7	50	-
	LT1F7	mg/kg	2.35	2.29		2.35	0.45	19.8			-	7	75	-
	LT1LS_2	mg/kg	2079	1957		2079	615	31.4			50	6	83	83
	LT1LS10	mg/kg	2116	1974		2116	616	31.2			50	6	83	83
Conductivity	LT1F1	mS/m	35100	31336	41661	35100	7820	25.0	21724	52.1	-	7	67	-
	LT1F2	mS/m	34000	38207	36404	34000	19053	49.9	17250	47.4	-	8	67	-
	LT1F3	mS/m	24000	23066	24821	24000	5665	24.6	8188	33.0	-	8	71	-
	LT1F4	mS/m	13190	12617	13026	13190	4896	38.8	4567	35.1	-	8	86	-
	LT1F5	mS/m	2245	2122	3105	2245	771	36.4	2204	71.0	-	8	57	-
	LT1F6	mS/m	415	388	524	415	106	27.4	306	58.3	-	8	71	-
	LT1F7	mS/m	204	206	177	204	24	11.5	66	37.4	-	8	43	-
Cr	LT1F1	mg/kg	2.90	2.46	2.50	2.90	1.11	45.1	1.17	46.9	-	7	83	-
	LT1F2	mg/kg	1.13	1.19		1.13	0.69	58.0			-	8	50	-
	LT1F3	mg/kg	1.70	1.65	1.71	1.70	0.49	29.9	0.43	25.3	-	8	71	-
	LT1F4	mg/kg	0.70	0.91	0.91	0.70	0.70	76.4	0.79	86.6	-	8	57	-
	LT1F5	mg/kg	0.038	0.048	0.319	0.038	0.033	68.0	0.532	166.8	-	8	43	-
	LT1F6	mg/kg	0.017	0.015	0.053	0.017	0.008	56.3	0.075	141.9	-	8	43	-
	LT1F7	mg/kg	0.013	0.014		0.013	0.008	52.5			-	8	75	-
	LT1LS_2	mg/kg	6.38	6.41	6.41	6.38	2.02	31.5	2.29	35.7	50	7	83	86
	LT1LS10	mg/kg	6.73	6.51	6.51	6.73	2.04	31.4	2.32	35.6	50	7	83	86
Cu	LT1F1	mg/kg	0.016	0.016		0.016	0.012	73.3			-	6	60	-
	LT1F2	mg/kg		0.007		0.004	0.010	132.5			-	7	-	-
	LT1F3	mg/kg	0.018	0.014		0.018	0.009	62.2			-	7	67	-
	LT1F4	mg/kg	0.005	0.005		0.005	0.004	75.4			-	7	40	-
	LT1F5	mg/kg		0.004		0.005	0.003	75.3			-	7	-	-
	LT1F6	mg/kg		0.008		0.003	0.011	141.8			-	8	-	-
	LT1F7	mg/kg		0.04		0.03	0.04	111.2			-	8	-	-
	LT1LS_2	mg/kg	0.044	0.047		0.044	0.028	58.8			-	6	80	-
	LT1LS10	mg/kg	0.054	0.058		0.054	0.021	35.7			50	6	80	100
DOC	LT1F1	mg/kg	13.8	14.6		13.8	3.3	22.4			-	6	80	-
	LT1F2	mg/kg	6.87	10.69		6.87	8.00	74.8			-	7	60	-
	LT1F3	mg/kg	7.73	9.99		7.73	7.01	70.2			-	7	67	-
	LT1F4	mg/kg	5.59	5.10		5.59	2.12	41.5			-	7	67	-
	LT1F5	mg/kg	4.03	3.57		4.03	1.75	49.1			-	7	75	-
	LT1F6	mg/kg	3.59	4.37		3.59	3.37	77.2			-	7	60	-
	LT1F7	mg/kg	5.83	8.12		4.29	9.76	120.3			-	7	75	-
	LT1LS_2	mg/kg	40.1	45.2		40.1	23.7	52.4			-	6	60	-
	LT1LS10	mg/kg	54.7	58.9		54.7	22.8	38.7			-	6	75	-

Table 1. The summary of the results in the proficiency test LT 14/2017.

Measurand	Sample	Unit	Assigned value	Mean	Rob. mean	Median	sd	sd %	s_{rob}	s_{rob} %	2 x s_{pt} %	n (all)	Acc E_n %	Acc z %
F	LT1F1	mg/kg	1.18	1.17		1.18	0.11	9.4			-	5	75	-
	LT1F2	mg/kg	0.88	0.78		0.88	0.46	59.3			-	6	75	-
	LT1F3	mg/kg	1.76	1.84		1.76	0.92	49.9			-	6	60	-
	LT1F4	mg/kg	1.19	1.08		1.19	0.56	51.8			-	6	50	-
	LT1F5	mg/kg	0.48	0.50		0.48	0.18	35.3			-	6	50	-
	LT1F6	mg/kg	0.49	0.50		0.49	0.21	43.0			-	6	80	-
	LT1F7	mg/kg		0.52		0.32	0.42	79.7			-	6	-	-
	LT1LS_2	mg/kg	5.43	6.18		5.43	2.98	48.3			-	5	60	-
	LT1LS10	mg/kg	6.43	7.18		6.43	3.35	46.6			-	5	60	-
Hg	LT1F1	mg/kg		0.0000		0.0000	0.0000	88.2			-	5	-	-
	LT1F2	mg/kg		0.0000		0.0000	0.0000	58.9			-	6	-	-
	LT1F3	mg/kg		0.0001		0.0001	0.0000	35.5			-	6	-	-
	LT1F4	mg/kg		0.0002		0.0001	0.0002	103.5			-	6	-	-
	LT1F5	mg/kg		0.0001		0.0002	0.0001	81.2			-	6	-	-
	LT1F6	mg/kg		0.0003		0.0002	0.0003	106.6			-	6	-	-
	LT1F7	mg/kg		0.0004		0.0003	0.0005	115.7			-	6	-	-
	LT1LS_2	mg/kg		0.0020		0.0004	0.0030	147.1			-	5	-	-
	LT1LS10	mg/kg		0.003		0.002	0.003	104.6			-	5	-	-
Mo	LT1F1	mg/kg	0.92	0.86	0.86	0.92	0.45	52.5	0.51	59.5	-	7	67	-
	LT1F2	mg/kg	0.27	0.33		0.27	0.21	64.9			-	8	50	-
	LT1F3	mg/kg	0.20	0.18	0.32	0.20	0.05	26.3	0.27	83.6	-	8	57	-
	LT1F4	mg/kg	0.05	0.06	0.21	0.05	0.04	63.0	0.31	144.3	-	8	43	-
	LT1F5	mg/kg	0.01	0.01		0.01	0.01	59.0			-	8	50	-
	LT1F6	mg/kg	0.003	0.003		0.003	0.002	81.7			-	8	50	-
	LT1F7	mg/kg		0.019		0.013	0.022	118.3			-	8	-	-
	LT1LS_2	mg/kg	1.91	1.77	1.77	1.91	0.76	42.9	0.86	48.6	50	7	67	71
	LT1LS10	mg/kg	2.00	1.81	1.81	2.00	0.79	43.5	0.89	49.2	50	7	67	71
Ni	LT1F1	mg/kg		0.001		0.001	0.001	57.5			-	6	-	-
	LT1F2	mg/kg		0.0012		0.0009	0.0007	54.5			-	7	-	-
	LT1F3	mg/kg		0.004		0.004	0.003	82.1			-	7	-	-
	LT1F4	mg/kg		0.0003		0.0003	0.0003	117.4			-	7	-	-
	LT1F5	mg/kg		0.0005		0.0005	0.0006	117.8			-	7	-	-
	LT1F6	mg/kg		0.0015		0.0015	0.0021	132.9			-	8	-	-
	LT1F7	mg/kg		0.003		0.003	0.003	121.9			-	8	-	-
	LT1LS_2	mg/kg		0.007		0.007	0.004	63.7			-	6	-	-
	LT1LS10	mg/kg		0.01		0.01	0.00	8.2			-	6	-	-
Pb	LT1F1	mg/kg	0.045	0.05		0.05	0.02	34.7			-	6	80	-
	LT1F2	mg/kg	0.031	0.031		0.031	0.019	59.4			-	7	60	-
	LT1F3	mg/kg	0.035	0.033		0.035	0.020	61.9			-	7	50	-
	LT1F4	mg/kg	0.005	0.005		0.005	0.003	66.3			-	7	40	-
	LT1F5	mg/kg		0.001		0.001	0.001	70.4			-	7	-	-
	LT1F6	mg/kg		0.002		0.002	0.001	86.4			-	8	-	-
	LT1F7	mg/kg		0.003		0.003	0.003	129.2			-	8	-	-
	LT1LS_2	mg/kg	0.13	0.11		0.13	0.04	33.7			50	6	80	80
	LT1LS10	mg/kg	0.14	0.11		0.14	0.04	33.8			50	6	80	80

Table 1. The summary of the results in the proficiency test LT 14/2017.

Measurand	Sample	Unit	Assigned value	Mean	Rob. mean	Median	sd	sd %	s_{rob}	s_{rob} %	2 x s_{pt} %	n (all)	Acc E_n %	Acc z %
pH	LT1F1		13.8	13.8	13.8	13.8	0.3	2.2	0.3	2.5	3.6	7	67	86
	LT1F2		13.8	13.7	13.7	13.8	0.3	2.1	0.3	2.4	3.6	8	67	86
	LT1F3		13.6	13.5	13.5	13.6	0.3	2.0	0.3	2.2	3.7	8	71	100
	LT1F4		13.1	13.2	13.2	13.1	0.4	2.7	0.4	3.0	3.8	8	57	88
	LT1F5		12.8	12.8	12.8	13.0	0.3	2.7	0.4	3.1	3.9	8	86	88
	LT1F6		12.1	12.1	12.1	12.1	0.3	2.6	0.4	2.9	4.1	8	86	88
	LT1F7		11.6	11.6	11.6	11.8	0.5	4.2	0.6	4.8	4.3	8	86	75
Sb	LT1F1	mg/kg	0.001	0.001		0.001	0.000	3.2			-	6	60	-
	LT1F2	mg/kg	0.001	0.001		0.001	0.001	38.0			-	7	40	-
	LT1F3	mg/kg	0.004	0.003		0.003	0.001	16.6			-	7	60	-
	LT1F4	mg/kg	0.003	0.003		0.003	0.002	64.8			-	7	60	-
	LT1F5	mg/kg		0.004		0.004	0.005	101.8			-	7	-	-
	LT1F6	mg/kg		0.012		0.007	0.016	125.5			-	7	-	-
	LT1F7	mg/kg		0.019		0.008	0.027	137.7			-	7	-	-
	LT1LS_2	mg/kg	0.016	0.023		0.016	0.019	84.0			-	6	75	-
	LT1LS10	mg/kg	0.052	0.055		0.052	0.044	80.4			-	6	100	-
Se	LT1F1	mg/kg	0.16	0.17		0.16	0.06	34.9			-	6	80	-
	LT1F2	mg/kg	0.049	0.056		0.049	0.037	65.9			-	7	60	-
	LT1F3	mg/kg	0.047	0.049		0.047	0.018	37.3			-	7	57	-
	LT1F4	mg/kg	0.016	0.014		0.016	0.010	68.2			-	7	50	-
	LT1F5	mg/kg		0.03		0.01	0.04	139.8			-	7	-	-
	LT1F6	mg/kg		0.01		0.01	0.02	145.7			-	8	-	-
	LT1F7	mg/kg		0.03		0.03	0.03	135.3			-	8	-	-
	LT1LS_2	mg/kg	0.25	0.27		0.25	0.09	34.7			50	6	67	67
	LT1LS10	mg/kg	0.29	0.28		0.29	0.10	35.4			50	6	83	100
SO_4	LT1F1	mg/kg	1869	1960		1869	925	47.2			-	6	83	-
	LT1F2	mg/kg	2700	2941		2700	971	33.0			-	7	67	-
	LT1F3	mg/kg	17200	16348	13549	17200	1448	8.9	5590	41.3	-	7	57	-
	LT1F4	mg/kg	5559	5103		5559	2688	52.7			-	7	71	-
	LT1F5	mg/kg	33.3	49.4		33.3	45.9	93.1			-	7	43	-
	LT1F6	mg/kg	11.1	11.2		11.1	5.1	45.5			-	7	50	-
	LT1F7	mg/kg	5.55	5.24		5.55	1.24	23.7			-	7	50	-
	LT1LS_2	mg/kg	26755	26755		27680	1512	5.7			20	6	83	83
	LT1LS10	mg/kg	27123	27123		27700	1059	3.9			20	6	83	83
V	LT1F1	mg/kg	8.66	7.78		8.66	3.73	48.0			-	6	83	-
	LT1F2	mg/kg	3.62	4.04		3.62	2.35	58.3			-	7	50	-
	LT1F3	mg/kg	5.59	5.23		5.59	1.62	31.0			-	7	71	-
	LT1F4	mg/kg	1.62	2.20		1.62	1.93	87.8			-	7	57	-
	LT1F5	mg/kg	0.16	0.14		0.16	0.05	37.3			-	7	43	-
	LT1F6	mg/kg	0.087	0.078		0.087	0.036	46.4			-	7	57	-
	LT1F7	mg/kg	0.029	0.035		0.029	0.012	34.7			-	7	43	-
	LT1LS_2	mg/kg	19.3	19.4		19.3	6.0	31.1			50	6	83	100
	LT1LS10	mg/kg	20.4	19.9		20.4	6.1	30.5			50	6	83	100

Table 1. The summary of the results in the proficiency test LT 14/2017.

Measurand	Sample	Unit	Assigned value	Mean	Rob. mean	Median	sd	sd %	s_{rob}	s_{rob} %	2 x s_{pt} %	n (all)	Acc E_n %	Acc z %
Zn	LT1F1	mg/kg	38.6	33.5	33.5	38.6	17.4	51.9	19.7	58.9	-	7	67	-
	LT1F2	mg/kg	25.2	23.7		25.2	15.5	65.2			-	8	50	-
	LT1F3	mg/kg	24.7	21.9	21.9	24.7	13.5	61.8	15.3	70.1	-	8	43	-
	LT1F4	mg/kg	4.89	6.39	6.39	4.89	7.15	111.9	8.11	126.9	-	8	29	-
	LT1F5	mg/kg	0.22	0.27	1.27	0.22	0.15	53.8	1.97	154.7	-	8	29	-
	LT1F6	mg/kg	0.036	0.039		0.036	0.016	40.5			-	8	57	-
	LT1F7	mg/kg		0.22		0.08	0.27	119.2			-	8	-	-
	LT1LS_2	mg/kg	92.7	82.7	82.7	92.7	36.9	44.6	41.8	50.6	50	7	67	86
	LT1LS10	mg/kg	92.7	83.1	83.1	92.7	36.6	44.0	41.5	49.9	50	7	67	86

Rob. mean: the robust mean, sd: the standard deviation, sd %: the standard deviation as percent, s_{rob}: the robust standard deviation, s_{rob} %: the robust standard deviation as percent, $2\times s_{pt}$ %: the standard deviation for proficiency assessment at the 95 % confidence level, Acc E_n %: the results (%), where $|E_n| < 1.0$, Acc z %: the results (%), where $|z| \leq 2$, n(all): the total number of the participants.

3.2 Analytical procedures

The standard method EN 14405:2017 (up-flow percolation test) [6] was used to determine the leaching properties of studied measurands from the fly ash sample. The sample material is subjected to percolation with water as a function of liquid to solid ratio under specified percolation conditions. The eluate is collected in separate fractions (Fraction 1 to fraction 7). Further, the cumulative L/S ratios 2.0 and 10.0 were requested to be calculated. The concentrations of the measurands are expressed as the leached amounts (mg/kg dry weight) relative to the total mass of the sample.

The details of the procedures the participants followed were collected via Webropol questionnaire. Seven participants replied to the questionnaire (Appendix 10).

The participants were allowed to use different analytical methods for the measurements of the measurands' concentrations in the PT. The measurements of metals were mostly done by ICP-MS and some participants used ICP-OES. The standard EN 16192 summarizes the analytical test methods for the waste eluates [8]. The statistical comparison of the analytical methods was not possible for the data due to low number of results. The used analytical test methods are listed in Appendix 11 and the reported results of the participants grouped by methods with their expanded uncertainties (k=2) are presented in Appendix 12.

As described in the standard, if the result in one or more eluate fractions was below the limit of detection, the cumulative results L/S 2 and L/S 10 were requested to be reported with upper and lower limit values [6]. Three participants reported upper and/or lower limit values (Table 2).

Table 2. Upper and lower limits for cumulative results L/S 2 and L/S 10 reported by participants.

Participant	Measurand	Sample	Unit	Result	Lower limit	Upper limit
3	As	LT1LS_2	mg/kg	0.711	0.711	0.712
		LT1LS10	mg/kg	0.713	0.713	0.722
	Cd	LT1LS_2	mg/kg	0.00274	0.00274	0.00304
	Cu	LT1LS10	mg/kg	0.0527	0.049	0.059
	DOC	LT1LS_2	mg/kg	22.6	22.6	27.6
	F	LT1LS10	mg/kg	7.76	6.85	8.45
	Hg	LT1LS_2	mg/kg	0.0055	0.0055	0.0059
		LT1LS10	mg/kg	0.0056	0.0055	0.0091
	Mo	LT1LS10	mg/kg	2.05		2.055
	Pb	LT1LS10	mg/kg	0.137		0.141
	Sb	LT1LS_2	mg/kg	0.0085		0.0095
	Se	LT1LS_2	mg/kg	0.38	0.0379	0.383
		LT1LS10	mg/kg	0.38	0.379	0.415
5	As	LT1LS_2	mg/kg	0.4544	0.4444	
		LT1LS10	mg/kg	0.5349	0.4444	
	Cd	LT1LS_2	mg/kg	0.0056	0.0053	
		LT1LS10	mg/kg	0.00801	0.0053	
	Cu	LT1LS_2	mg/kg	0.0140	0.00501	
		LT1LS10	mg/kg	0.0543	0.00501	
	F	LT1LS_2	mg/kg	10.72	0.684	
		LT1LS10	mg/kg	12.33	0.684	
	Hg	LT1LS_2	mg/kg	0.00040	0	
		LT1LS10	mg/kg	0.0020	0	
	Mo	LT1LS_2	mg/kg	1.486	1.476	
		LT1LS10	mg/kg	1.566	1.476	
	Ni	LT1LS_2	mg/kg	0.00384	0.00204	
		LT1LS10	mg/kg	0.0119	0.00204	
	Pb	LT1LS_2	mg/kg	0.1284	0.1274	
		LT1LS10	mg/kg	0.1364	0.1274	
	Sb	LT1LS_2	mg/kg	0.0203	0.00122	
		LT1LS10	mg/kg	0.101	0.00122	
	Se	LT1LS_2	mg/kg	0.2790	0.2690	
		LT1LS10	mg/kg	0.3595	0.2690	
8	As	LT1LS10	mg/kg	0.7125	0.7123	0.7284
	Cd	LT1LS10	mg/kg	0.002279	0.00221	0.00410
	Cl	LT1LS10	mg/kg	2521.681	2519.193	2521.681
	Cr	LT1LS10	mg/kg	8.9413	8.9327	8.9576
	Cu	LT1LS10	mg/kg	0.0807	0.0748	0.1195
	F	LT1LS10	mg/kg	6.247	5.749	6.247
	Mo	LT1LS10	mg/kg	2.1021	2.0994	2.1094
	Ni	LT1LS10	mg/kg	<0.00672	0.00055	0.05002
	Pb	LT1LS10	mg/kg	0.1412	0.1390	0.1569
	Sb	LT1LS10	mg/kg	0.01247	0.01215	0.02016
	Se	LT1LS10	mg/kg	0.3817	0.3805	0.3965
	Zn	LT1LS10	mg/kg	92.7447	92.7349	92.7598

3.3 Uncertainties of the results

Altogether 88 % of the participants reported the expanded uncertainties (k=2) with their results for at least some of their results (Appendix 12, Appendix 13). The range of the reported uncertainties varied between the measurands and fractions (Table 3).

Table 3. The range of the expanded measurement uncertainties (k=2, U%) reported by the participants

Measurand	As	Ba	Cd	Cl^-	Conductivity	Cr	Cu	DOC	F^-	Hg
U%	17–40	14–40	14–40	12–40	3–26	12–40	12–40	10–40	12–40	9–75

Measurand	Mo	Ni	Pb	pH	Sb	Se	SO_4^{2-}	V	Zn
U%	15–58	16–53	19–40	0.2-26	20–44	10–41	12–40	12–31	12–40

Several approaches were used for estimating of measurement uncertainty (Appendix 14). The most used approaches were based on the internal quality control data and data from method validation. Two participants used MUkit measurement uncertainty software for the estimation of their uncertainties [9]. The free software is available on the webpage: www.syke.fi/envical/en. Generally, the used approach for estimating measurement uncertainty did not make definite impact on the uncertainty estimates.

4 Evaluation of the results

The overall evaluation of the participants was based on the E_n scores, which were calculated using the assigned values and the standard deviation for performance assessment (Appendix 7). The results for pH as well as for the cumulative values L/S 2 and L/S 10 were evaluated also with the z scores (Appendix 8). The interpretation of the E_n and z scores is as follows:

Criteria	Performance
$-1.0 < E_n < 1.0$	Satisfactory
$E_n \leq -1.0$ or $E_n \geq 1.0$	Unsatisfactory
$\lvert z \rvert \leq 2$	Satisfactory
$2 < \lvert z \rvert < 3$	Questionable
$\lvert z \rvert \geq 3$	Unsatisfactory

In total 64 % of the all the evaluated results were satisfactory when evaluated by E_n scores (Appendix 7). The performance evaluation for the results for pH as well as for the cumulative values L/S 2 and L/S 10 of the measurands was done also with the z scores. In the evaluation based on z scores, 85 % of the results were satisfactory, when deviation was set to 0.5 pH units, to 20 % for SO_4 and to 50 % for other measurands (Appendix 8). For these same results, 78 % of the results were satisfactory when evaluated with the E_n scores (Appendix 7). Altogether 75 % of the participants used accredited analytical methods at least for a part of the measurements. The summary of the performance evaluation is presented in Table 4.

Table 4. Summary of the performance evaluation in the proficiency test LT 14/2017.

Sample	Measurand	2 × s_{pt}, %	z scores, satisfactory results, %	E_n scores, satisfactory results, %	Assessment
LT1, F1-F7	metals	-	-	57	
	anions	-	-	61	
	conductivity	-	-	66	
	DOC	-	-	69	
	pH	3.6-4.3	87	74	
LT1, L/S 2	metals	50	78	79	11 of 13 metals were evaluated by E_n scores and only 8 of 13 metals were evaluated by z scores.
	anions	20-50	83	76	F was evaluated only by E_n scores.
	DOC	-	-	60	
LT1, L/S 10	metals	50	90	81	10 of 13 metals were evaluated by E_n scores and 9 of 13 metals were evaluated by z scores.
	anions	20-50	83	76	F was evaluated only by E_n scores.
	DOC	-	-	75	

5 Summary

Proftest SYKE carried out the proficiency test (PT) in cooperation with the KVVY Tutkimus Oy for the laboratories conducting leaching tests for solid waste sample at the turn of the year 2017–2018 (LT 14/2017). The results of the up-flow percolation test (EN 14405:2017) for fly ash samples were compared and evaluated. The tested measurands were metals (As, Ba, Cd, Cr, Cu, Hg, Mo, Ni, Pb, Sb, Se, V, Zn), Cl^-, SO_4^{2-}, F^-, DOC, pH, and conductivity. In total 8 laboratories participated in this PT.

Either the mean or the median of the results reported by the participants was chosen to be the assigned value for the measurands. The overall performance evaluation was done with the E_n scores and 64 % of the all the evaluated results were satisfactory. The performance evaluation for the results for pH as well as for the cumulative values L/S 2 and L/S 10 of the measurands was done also with the z scores, which were calculated using the standard deviation for proficiency assessment at 95 % confidence level. In the evaluation based on z scores, 85 % of the results were satisfactory, when deviation was set to 0.5 pH units, to 20 % for SO_4 and to 50 % for other measurands. For these same results, 78 % of the results were satisfactory when evaluated with the E_n scores.

6 Summary in Finnish

Proftest SYKE järjesti yhteistyössä KVVY Tutkimus OY:n kanssa pätevyyskokeen vuodenvaihteessa 2017-2018 laboratorioille, jotka tekevät liukoisuustestejä jätteiden kaatopaikkakelpoisuuden arvioimiseksi (LT 14/2017). Pätevyyskokeessa vertailun kohteena oli läpivirtaustesti (EN 14405:2017). Liukoisuustestin fraktioista analysoitiin metallit (As, Ba, Cd, Cr, Cu, Hg, Mo, Ni, Pb, Sb, Se, V, Zn) sekä testisuureet Cl^-, SO_4^{2-}, F^-, DOC, pH ja sähkönjohtavuus. Pätevyyskokeeseen osallistui yhteensä 8 laboratoriota.

Testisuureen vertailuarvona käytettiin osallistujien tulosten keskiarvoa tai mediaania. Pätevyyden arviointi tehtiin tässä vertailussa koko aineistolle E_n-arvoilla ja 64 % arvioiduista tuloksista oli hyväksyttäviä. Lisäksi pätevyyden arviointi tehtiin z-arvoilla kumulatiivisten arvojen L/S 2 ja L/S 10 sekä pH määritysten tuloksille. Tuloksista, jotka arvioitiin z-arvoilla, 85 % oli hyväksyttäviä kun vertailuarvosta sallittiin pH-määrityksissä 0,5 pH-yksikön, SO_4-määrityksissä 20 % ja muilla testisuureilla 50 % poikkeama. Näistä tuloksista 78 % oli hyväksyttäviä E_n-arvoilla arvioituna.

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APPENDIX 1: Participants in the proficiency test

Country	Participant
Finland	Eurofins Ahma Oy, Oulu Eurofins Environment Testing Finland Oy, Lahti Eurofins Environment Testing Finland Oy, Vantaa, Industry and Power Plant Chemistry KVVY Tutkimus Oy, Tampere
Germany	Eurofins Umwelt Ost GmbH, Niederlassung Freiberg
Greece	Laboratory of Metallurgy, National Technical University of Athens
Norway	NGI Miljlab Oslo
Sweden	Eurofins Environment Testing Sweden AB, Lidköping

APPENDIX 2: Homogeneity of the samples

Homogeneity of the fly ash samples was tested by analyzing the total metal concentrations from 6 subsamples with replicated analyses.

Criteria for homogeneity:

$$\mathbf{s_{anal}/s_h < 0.5}$$

$$\mathbf{s_{sam}^2 < c}, \text{ where}$$

s_h = standard deviation for testing of homogeneity
s_{anal} = analytical deviation, standard deviation of the results in a sub sample
s_{sam} = between-sample deviation, standard deviation of results between sub samples

$c = F1 \times s_{all}^2 + F2 \times s_{anal}^2$, where

$s_{all}^2 = (0.3 \times s_h)^2$

F1 and F2 are constants of F distribution derived from the standard statistical tables for the tested number of samples [2, 3].

Measurand	Concentration [mg/kg]	n	s_{pt} %	s_h %	s_h	s_{anal}	s_{anal}/s_h	s_{anal}/s_h<0.5?	s_{sam}^2	c	s_{sam}^2<c?
As	1.60	4	50	11	0.18	0.09	0.49	Yes	0	0.03	Yes
Ba	2488	4	50	6.5	162	79	0.49	Yes	833	23602	Yes
Cr	24.4	4	50	5.5	1.34	0.61	0.46	Yes	0	1.47	Yes
Mo	2.11	4	50	12	0.25	0.12	0.46	Yes	0	0.05	Yes
Pb	19.4	4	50	12.5	2.42	1.17	0.48	Yes	0	5.22	Yes
Se	0.21	4	50	15	0.03	0.02	0.48	Yes	0	0.002	Yes
Zn	2450	4	50	9.5	233	112	0.48	Yes	2083	47646	Yes

s_{pt} %= standard deviation for proficiency assessment for L/S 2 and L/S 10.

Conclusion: The criteria were fulfilled for the tested measurands and the samples were regarded as homogenous.

APPENDIX 3: Feedback from the proficiency test

FEEDBACK FROM THE PARTICIPANTS

Participant	Comments on technical excecution	Action / Proftest SYKE
1	The tested ash sample had very high conductivity, which causes challenges for the measurements: the sample needed to be diluted and therefore the limits of detection needed to be higher. The participant requested could there be an option to test a sample with lower conductivity.	The sample was real material, not manipulated chemically. The proficiency testing material for leaching tests is rather difficult to find as the provider tries to find stable, homogenous material which would also be suitable for the current test (here up-flow percolation) in order to ensure that most participants could report most results. Therefore the current sample had high conductivity. The provider is constantly looking for suitable materials for future tests.
4	The participant reported that due to the holiday season they had the sample package only on 2.1.2018.	According to the tracking code, the package was at the final destination on 20.12.2018. Further, the sample is known to be stable.
5	Some of the cells in the Webropol questionnaire did not work properly.	The provider appreciated the observation, fixed the form and informed all the participants.

Participant	Comments to the results	Action / Proftest SYKE
1	The participant commented that the result reporting form is very time consuming and asked could the amount of work be reduced somehow. Currently all the same information needs be filled for many places.	The provider is aware that the result reporting via the ProftestWEB is laborious for very large proficiency tests like the current PT. The result sheet already has the memory effect for the method selection and the bottle number as well as for the measurement uncertainty reporting.
1	The participant reported that the preservation of the sample was challenging. When measured from less diluted sample, there seemed to be no DOC. When measured the sample more diluted, DIC concentration was lower and DOC higher. The participant asked information for the most appropriate method for DOC measurement for such samples to ensure that all inorganic carbon is removed from the sample before measuring TOC.	According to the standard EN 1484, UV method could be used for low polluted waters containing low concentrations of TOC. In chemical combustion, all the compounds in the sample use the oxidant and, therefore, the adequacy of the oxidizing agent should be ensured. The participant reported dilution of 1:1000 for the sample which seemed to be appropriate to ensure the measurement of all organic carbon by their method.

APPENDIX 4: Evaluation of the assigned values and their uncertainties

Measurand	Sample	Unit	Assigned value	U_{pt}	U_{pt}, %	Evaluation method of assigned value	u_{pt}/s_{pt}
As	LT1F1	mg/kg	0.31	0.13	41	Mean	
	LT1F2	mg/kg	0.066	0.046	69	Median	
	LT1F3	mg/kg	0.11	0.04	38	Median	
	LT1F4	mg/kg	0.013	0.012	96	Median	
	LT1LS_2	mg/kg	0.46	0.15	33	Median	0.66
	LT1LS10	mg/kg	0.50	0.16	32	Median	0.64
Ba	LT1F1	mg/kg	0.15	0.06	40	Median	
	LT1F2	mg/kg	0.11	0.06	56	Median	
	LT1F3	mg/kg	0.21	0.07	32	Median	
	LT1F4	mg/kg	0.14	0.05	37	Median	
	LT1F5	mg/kg	0.18	0.11	62	Median	
	LT1F6	mg/kg	0.75	0.29	38	Median	
	LT1F7	mg/kg	3.01	0.84	28	Median	
	LT1LS_2	mg/kg	0.92	0.19	21	Median	0.42
	LT1LS10	mg/kg	5.12	1.08	21	Median	0.42
Cd	LT1F1	mg/kg	0.0008	0.0005	59	Mean	
	LT1F2	mg/kg	0.0009	0.0005	59	Median	
	LT1F3	mg/kg	0.0006	0.0004	70	Median	
	LT1LS_2	mg/kg	0.004	0.002	59	Mean	
Cl	LT1F1	mg/kg	1233	493	40	Median	
	LT1F2	mg/kg	617	364	59	Median	
	LT1F3	mg/kg	217	106	49	Median	
	LT1F4	mg/kg	19.6	11.4	58	Median	
	LT1F5	mg/kg	4.80	2.26	47	Median	
	LT1F6	mg/kg	2.77	1.88	68	Median	
	LT1F7	mg/kg	2.35	0.47	20	Median	
	LT1LS_2	mg/kg	2079	541	26	Median	0.52
	LT1LS10	mg/kg	2116	550	26	Median	0.52
Conductivity 25	LT1F1	mS/m	35100	7722	22	Median	
	LT1F2	mS/m	34000	12920	38	Median	
	LT1F3	mS/m	24000	4560	19	Median	
	LT1F4	mS/m	13190	3561	27	Median	
	LT1F5	mS/m	2245	674	30	Median	
	LT1F6	mS/m	415	91	22	Median	
	LT1F7	mS/m	204	19	9.4	Median	
Cr	LT1F1	mg/kg	2.90	0.99	34	Median	
	LT1F2	mg/kg	1.13	0.53	47	Median	
	LT1F3	mg/kg	1.70	0.39	23	Median	
	LT1F4	mg/kg	0.70	0.41	58	Median	
	LT1F5	mg/kg	0.038	0.023	61	Median	
	LT1F6	mg/kg	0.017	0.009	50	Median	
	LT1F7	mg/kg	0.013	0.008	61	Median	
	LT1LS_2	mg/kg	6.38	1.53	24	Median	0.48
	LT1LS10	mg/kg	6.73	1.62	24	Median	0.48

Measurand	Sample	Unit	Assigned value	U_{pt}	U_{pt}, %	Evaluation method of assigned value	u_{pt}/s_{pt}
Cu	LT1F1	mg/kg	0.016	0.011	66	Median	
	LT1F3	mg/kg	0.018	0.010	56	Median	
	LT1F4	mg/kg	0.005	0.004	75	Median	
	LT1LS_2	mg/kg	0.044	0.023	53	Median	
	LT1LS10	mg/kg	0.054	0.017	32	Median	0.64
DOC	LT1F1	mg/kg	13.8	3.0	22	Median	
	LT1F2	mg/kg	6.87	4.60	67	Median	
	LT1F3	mg/kg	7.73	4.87	63	Median	
	LT1F4	mg/kg	5.59	2.07	37	Median	
	LT1F5	mg/kg	4.03	1.97	49	Median	
	LT1F6	mg/kg	3.59	2.76	77	Median	
	LT1F7	mg/kg	5.83	5.36	92	Median	
	LT1LS_2	mg/kg	40.1	20.9	52	Median	
	LT1LS10	mg/kg	54.7	24.6	45	Median	
F	LT1F1	mg/kg	1.18	0.10	8.4	Median	
	LT1F2	mg/kg	0.88	0.52	59	Median	
	LT1F3	mg/kg	1.76	0.79	45	Median	
	LT1F4	mg/kg	1.19	0.62	52	Median	
	LT1F5	mg/kg	0.48	0.15	32	Median	
	LT1F6	mg/kg	0.49	0.21	43	Median	
	LT1LS_2	mg/kg	5.43	2.33	43	Median	
	LT1LS10	mg/kg	6.43	2.70	42	Median	
Mo	LT1F1	mg/kg	0.92	0.37	40	Median	
	LT1F2	mg/kg	0.27	0.14	53	Median	
	LT1F3	mg/kg	0.20	0.05	24	Median	
	LT1F4	mg/kg	0.05	0.03	56	Median	
	LT1F5	mg/kg	0.01	0.01	59	Median	
	LT1F6	mg/kg	0.003	0.002	82	Median	
	LT1LS_2	mg/kg	1.91	0.61	32	Median	0.64
	LT1LS10	mg/kg	2.00	0.66	33	Median	0.66
Pb	LT1F1	mg/kg	0.045	0.02	35	Median	
	LT1F2	mg/kg	0.031	0.018	59	Median	
	LT1F3	mg/kg	0.035	0.019	55	Median	
	LT1F4	mg/kg	0.005	0.003	66	Median	
	LT1LS_2	mg/kg	0.13	0.04	30	Median	0.60
	LT1LS10	mg/kg	0.14	0.04	30	Median	0.60
pH	LT1F1		13.8	0.2	1.7	Median	0.47
	LT1F2		13.8	0.2	1.6	Median	0.44
	LT1F3		13.6	0.2	1.4	Median	0.38
	LT1F4		13.1	0.2	1.9	Median	0.50
	LT1F5		12.8	0.2	1.9	Mean	0.49
	LT1F6		12.1	0.2	1.8	Median	0.44
	LT1F7		11.6	0.3	3.0	Mean	0.70
Sb	LT1F1	mg/kg	0.001	0.000	3.7	Median	
	LT1F2	mg/kg	0.001	0.000	38	Median	
	LT1F3	mg/kg	0.004	0.001	17	Median	
	LT1F4	mg/kg	0.003	0.002	65	Median	
	LT1LS_2	mg/kg	0.016	0.013	84	Median	
	LT1LS10	mg/kg	0.052	0.048	93	Median	

Measurand	Sample	Unit	Assigned value	U_{pt}	U_{pt}, %	Evaluation method of assigned value	u_{pt}/s_{pt}
Se	LT1F1	mg/kg	0.16	0.05	31	Median	
	LT1F2	mg/kg	0.049	0.032	66	Median	
	LT1F3	mg/kg	0.047	0.014	30	Median	
	LT1F4	mg/kg	0.016	0.011	68	Median	
	LT1LS_2	mg/kg	0.25	0.07	28	Median	0.56
	LT1LS10	mg/kg	0.29	0.08	29	Median	0.58
SO_4	LT1F1	mg/kg	1869	729	39	Median	
	LT1F2	mg/kg	2700	729	27	Median	
	LT1F3	mg/kg	17200	1359	7.9	Median	
	LT1F4	mg/kg	5559	2390	43	Median	
	LT1F5	mg/kg	33.3	31.0	93	Median	
	LT1F6	mg/kg	11.1	5.0	45	Median	
	LT1F7	mg/kg	5.55	1.50	27	Median	
	LT1LS_2	mg/kg	26755	1365	5.1	Mean	0.26
	LT1LS10	mg/kg	27123	949	3.5	Mean	0.18
V	LT1F1	mg/kg	8.66	3.38	39	Median	
	LT1F2	mg/kg	3.62	1.88	52	Median	
	LT1F3	mg/kg	5.59	1.40	25	Median	
	LT1F4	mg/kg	1.62	1.17	72	Median	
	LT1F5	mg/kg	0.16	0.06	37	Median	
	LT1F6	mg/kg	0.087	0.037	42	Median	
	LT1F7	mg/kg	0.029	0.009	31	Median	
	LT1LS_2	mg/kg	19.3	4.8	25	Median	0.50
	LT1LS10	mg/kg	20.4	5.1	25	Median	0.50
Zn	LT1F1	mg/kg	38.6	15.1	39	Median	
	LT1F2	mg/kg	25.2	13.4	53	Median	
	LT1F3	mg/kg	24.7	11.6	47	Median	
	LT1F4	mg/kg	4.89	4.16	85	Median	
	LT1F5	mg/kg	0.22	0.11	48	Median	
	LT1F6	mg/kg	0.036	0.015	41	Median	
	LT1LS_2	mg/kg	92.7	31.5	34	Median	0.68
	LT1LS10	mg/kg	92.7	30.6	33	Median	0.66

U_{pt} = Expanded uncertainty of the assigned value
Criterion for reliability of the assigned value $u_{pt}/s_{pt} \leq 0.3$, where
s_{pt}= the standard deviation for proficiency assessment
u_{pt}= the standard uncertainty of the assigned value

If $u_{pt}/s_{pt} \leq 0.3$, the assigned value is reliable and the z scores are qualified.

APPENDIX 5: Terms in the results tables

Results of each participant

Measurand	The tested parameter
Sample	The code of the sample
z score	Calculated as follows: $z = (x_i - x_{pt})/s_{pt}$, where x_i = the result of the individual participant x_{pt} = the assigned value s_{pt} = the standard deviation for proficiency assessment
Assigned value	The reference value
2 × s_{pt} %	The standard deviation for proficiency assessment (s_{pt}) at the 95 % confidence level
Participant's result	The result reported by the participant (the mean value of the replicates)
Md	Median
sd	Standard deviation
sd%	Standard deviation, %
n (stat)	Number of results in statistical processing

Summary on the z scores

S – satisfactory ($-2 \le z \le 2$)
Q – questionable ($2 < z < 3$), positive error, the result deviates more than 2 × s_{pt} from the assigned value
q – questionable ($-3 < z < -2$), negative error, the result deviates more than 2 × s_{pt} from the assigned value
U – unsatisfactory ($z \ge 3$), positive error, the result deviates more than 3 × s_{pt} from the assigned value
u – unsatisfactory ($z \le -3$), negative error, the result deviates more than 3 × s_{pt} from the assigned value

Robust analysis

The items of data are sorted into increasing order, $x_1, x_2, x_i, \ldots, x_p$.
Initial values for x^* and s^* are calculated as:
x^* = median of x_i (i = 1, 2, ...,p)
s^* = 1.483 × median of $|x_i - x^*|$ (i = 1, 2, ...,p)

The mean x^* and s^* are updated as follows:
Calculate $\varphi = 1.5 \times s^*$. A new value is then calculated for each result x_i $(i = 1, 2 \ldots p)$:

$$x_i^* = \begin{cases} x^* - \varphi, & \text{if } x_i < x^* - \varphi \\ x^* + \varphi, & \text{if } x_i > x^* + \varphi, \\ x_i & \text{otherwise} \end{cases}$$

The new values of x^* and s^* are calculated from:

$$x^* = \sum x_i^* / p$$

$$s^* = 1.134\sqrt{\sum (x_i^* - x^*)^2 / (p-1)}$$

The robust estimates x^* and s^* can be derived by an iterative calculation, i.e. by updating the values of x^* and s^* several times, until the process convergences [2].

APPENDIX 6: Results of each participant

Participant 1												
Measurand	Unit	Sample	-3 0 3	z score	Assigned value	2×s_{pt} %	Participant's result	Md	Mean	sd	sd %	n (stat)
As	mg/kg	LT1F2			0.066		*0,2234*	0.066	0.096	0.074	76.7	5
	mg/kg	LT1F3			0.11		0.11	0.11	0.10	0.05	46.9	6
	mg/kg	LT1F4			0.013		*<0,02*	0.013	0.017	0.016	96.3	4
	mg/kg	LT1F5					*<0,02*	0.005	0.005	0.005	98.5	3
	mg/kg	LT1F6					*<0,02*	0.02	0.02	0.02	141.3	2
	mg/kg	LT1F7					*<0,02*	0.02	0.02	0.04	141.7	2
	mg/kg	LT1LS_2		-0.93	0.46	50	0.35	0.46	0.49	0.20	40.4	6
	mg/kg	LT1LS10		-1.18	0.50	50	0.35	0.50	0.50	0.20	39.4	6
Ba	mg/kg	LT1F2			0.11		*0,2789*	0.11	0.12	0.08	68.0	6
	mg/kg	LT1F3			0.21		0.41	0.21	0.25	0.10	42.4	7
	mg/kg	LT1F4			0.14		0.03	0.14	0.14	0.06	44.8	6
	mg/kg	LT1F5			0.18		0.06	0.18	0.19	0.15	76.2	6
	mg/kg	LT1F6			0.75		0.75	0.75	0.92	0.46	49.7	7
	mg/kg	LT1F7			3.01		1.24	3.01	2.54	1.02	40.1	8
	mg/kg	LT1LS_2		-0.63	0.92	50	0.78	0.92	0.86	0.22	26.1	6
	mg/kg	LT1LS10		-1.84	5.12	50	2.77	5.12	4.75	1.23	25.9	6
Cd	mg/kg	LT1F2			0.0009		*<0,02*	0.0009	0.0008	0.0005	58.8	4
	mg/kg	LT1F3			0.0006		*<0,02*	0.0006	0.0009	0.0006	60.3	3
	mg/kg	LT1F4					*<0,02*	0.002	0.003	0.004	126.8	3
	mg/kg	LT1F5					*<0,02*	0.000	0.003	0.004	163.6	3
	mg/kg	LT1F6					*<0,02*	0.0009	0.0029	0.0043	147.0	3
	mg/kg	LT1F7					*<0,02*	0.002	0.003	0.004	124.6	3
	mg/kg	LT1LS_2			0.004		*<0,02*	0.003	0.004	0.002	51.1	3
	mg/kg	LT1LS10					*<0,02*	0.005	0.005	0.004	78.8	2
Cl	mg/kg	LT1F2			617		*1206,90015*	617	469	307	65.5	5
	mg/kg	LT1F3			217		217	217	271	163	59.9	6
	mg/kg	LT1F4			19.6		19.6	19.6	21.9	14.1	64.4	5
	mg/kg	LT1F5			4.80		5.33	4.80	4.49	2.10	46.8	4
	mg/kg	LT1F6			2.77		7.26	2.77	3.64	2.46	67.6	4
	mg/kg	LT1F7			2.35		2.15	2.35	2.29	0.45	19.8	4
	mg/kg	LT1LS_2		-1.21	2079	50	1449	2079	1957	615	31.4	6
	mg/kg	LT1LS10		-1.24	2116	50	1458	2116	1974	616	31.2	6
Conductivity 25	mS/m	LT1F2			34000		*31600*	34000	38207	19053	49.9	7
	mS/m	LT1F3			24000		24300	24000	23066	5665	24.6	7
	mS/m	LT1F4			13190		10140	13190	12617	4896	38.8	8
	mS/m	LT1F5			2245		2110	2245	2122	771	36.4	6
	mS/m	LT1F6			415		399	415	388	106	27.4	6
	mS/m	LT1F7			204		99	204	206	24	11.5	6
Cr	mg/kg	LT1F2			1.13		*2,7731*	1.13	1.19	0.69	58.0	6
	mg/kg	LT1F3			1.70		1.70	1.70	1.65	0.49	29.9	7
	mg/kg	LT1F4			0.70		0.42	0.70	0.91	0.70	76.4	7
	mg/kg	LT1F5			0.038		0.057	0.038	0.048	0.033	68.0	5
	mg/kg	LT1F6			0.017		0.025	0.017	0.015	0.008	56.3	5
	mg/kg	LT1F7			0.013		*<0,02*	0.013	0.014	0.008	52.5	3
	mg/kg	LT1LS_2		-0.89	6.38	50	4.96	6.38	6.41	2.02	31.5	7
	mg/kg	LT1LS10		-1.03	6.73	50	5.00	6.73	6.51	2.04	31.4	7

Participant 1												
Measurand	Unit	Sample	-3 0 3	z score	Assigned value	2×s_{pt} %	Participant's result	Md	Mean	sd	sd %	n (stat)
Cu	mg/kg	LT1F2					*0,0401*	0.004	0.007	0.010	132.5	4
	mg/kg	LT1F3			0.018		0.022	0.018	0.014	0.009	62.2	5
	mg/kg	LT1F4			0.005		*<0,02*	0.005	0.005	0.004	75.4	4
	mg/kg	LT1F5					*<0,02*	0.005	0.004	0.003	75.3	3
	mg/kg	LT1F6					*<0,02*	0.003	0.008	0.011	141.8	3
	mg/kg	LT1F7					*<0,02*	0.03	0.04	0.04	111.2	3
	mg/kg	LT1LS_2			0.044		0.072	0.044	0.047	0.028	58.8	5
	mg/kg	LT1LS10		1.61	0.054	50	0.076	0.054	0.058	0.021	35.7	5
DOC	mg/kg	LT1F2			6.87		*62,8003*	6.87	10.69	8.00	74.8	5
	mg/kg	LT1F3			7.73		7.73	7.73	9.99	7.01	70.2	5
	mg/kg	LT1F4			5.59		3.79	5.59	5.10	2.12	41.5	5
	mg/kg	LT1F5			4.03		3.85	4.03	3.57	1.75	49.1	4
	mg/kg	LT1F6			3.59		2.57	3.59	4.37	3.37	77.2	4
	mg/kg	LT1F7			5.83		2.75	4.29	8.12	9.76	120.3	4
	mg/kg	LT1LS_2			40.1		78.2	40.1	45.2	23.7	52.4	4
	mg/kg	LT1LS10			54.7		83.5	54.7	58.9	22.8	38.7	3
F	mg/kg	LT1F2			0.88		*2,0067*	0.88	0.78	0.46	59.3	4
	mg/kg	LT1F3			1.76		1.76	1.76	1.84	0.92	49.9	5
	mg/kg	LT1F4			1.19		1.19	1.19	1.08	0.56	51.8	4
	mg/kg	LT1F5			0.48		0.48	0.48	0.50	0.18	35.3	5
	mg/kg	LT1F6			0.49		0.75	0.49	0.50	0.21	43.0	4
	mg/kg	LT1F7					0.2499	0.32	0.52	0.42	79.7	3
	mg/kg	LT1LS_2			5.43		5.43	5.43	6.18	2.98	48.3	5
	mg/kg	LT1LS10			6.43		6.43	6.43	7.18	3.35	46.6	5
Hg	mg/kg	LT1F2					*<0,003*	0.0000	0.0000	0.0000	58.9	3
	mg/kg	LT1F3					*<0,003*	0.0001	0.0001	0.0000	35.5	3
	mg/kg	LT1F4					*<0,003*	0.0001	0.0002	0.0002	103.5	4
	mg/kg	LT1F5					*<0,003*	0.0002	0.0001	0.0001	81.2	3
	mg/kg	LT1F6					*<0,003*	0.0002	0.0003	0.0003	106.6	3
	mg/kg	LT1F7					*<0,003*	0.0003	0.0004	0.0005	115.7	3
	mg/kg	LT1LS_2					*<0,003*	0.0004	0.0020	0.0030	147.1	3
	mg/kg	LT1LS10					*<0,003*	0.002	0.003	0.003	104.6	3
Mo	mg/kg	LT1F2			0.27		*0,7085*	0.27	0.33	0.21	64.9	6
	mg/kg	LT1F3			0.20		0.22	0.20	0.18	0.05	26.3	5
	mg/kg	LT1F4			0.05		0.06	0.05	0.06	0.04	63.0	5
	mg/kg	LT1F5			0.01		*<0,02*	0.01	0.01	0.01	59.0	4
	mg/kg	LT1F6			0.003		*<0,02*	0.003	0.003	0.002	81.7	4
	mg/kg	LT1F7					*<0,02*	0.013	0.019	0.022	118.3	4
	mg/kg	LT1LS_2		-1.91	1.91	50	1.00	1.91	1.77	0.76	42.9	7
	mg/kg	LT1LS10		-1.99	2.00	50	1.01	2.00	1.81	0.79	43.5	7
Ni	mg/kg	LT1F2					*<0,02*	0.0009	0.0012	0.0007	54.5	3
	mg/kg	LT1F3					*<0,02*	0.004	0.004	0.003	82.1	3
	mg/kg	LT1F4					*<0,02*	0.0003	0.0003	0.0003	117.4	2
	mg/kg	LT1F5					*<0,02*	0.0005	0.0005	0.0006	117.8	2
	mg/kg	LT1F6					*<0,02*	0.0015	0.0015	0.0021	132.9	2
	mg/kg	LT1F7					*<0,02*	0.003	0.003	0.003	121.9	2
	mg/kg	LT1LS_2					*<0,02*	0.007	0.007	0.004	63.7	2
	mg/kg	LT1LS10					*<0,02*	0.01	0.01	0.00	8.2	2

Participant 1												
Measurand	Unit	Sample	-3 0 3	z score	Assigned value	2×s_{pt} %	Participant's result	Md	Mean	sd	sd %	n (stat)
Pb	mg/kg	LT1F2			0.031		*0,0592*	0.031	0.031	0.019	59.4	4
	mg/kg	LT1F3			0.035		0.037	0.035	0.033	0.020	61.9	5
	mg/kg	LT1F4			0.005		*<0,02*	0.005	0.005	0.003	66.3	4
	mg/kg	LT1F5					*<0,02*	0.001	0.001	0.001	70.4	3
	mg/kg	LT1F6					0.002	0.002	0.002	0.001	86.4	3
	mg/kg	LT1F7					*<0,02*	0.003	0.003	0.003	129.2	2
	mg/kg	LT1LS_2		-0.92	0.13	50	0.10	0.13	0.11	0.04	33.7	5
	mg/kg	LT1LS10		-1.07	0.14	50	0.10	0.14	0.11	0.04	33.8	5
pH		LT1F2			13.8	3,6	*13,15*	13.8	13.7	0.3	2.1	7
		LT1F3		-1.03	13.6	3,7	13.3	13.6	13.5	0.3	2.0	8
		LT1F4		-0.52	13.1	3,8	13.0	13.1	13.2	0.4	2.7	8
		LT1F5		-1.64	12.8	3,9	12.4	13.0	12.8	0.3	2.7	8
		LT1F6		-0.08	12.1	4,1	12.1	12.1	12.1	0.3	2.6	8
		LT1F7		-0.48	11.6	4,3	11.5	11.8	11.6	0.5	4.2	8
Sb	mg/kg	LT1F2			0.001		*<0,02*	0.001	0.001	0.001	38.0	4
	mg/kg	LT1F3			0.004		*<0,02*	0.003	0.003	0.001	16.6	4
	mg/kg	LT1F4			0.003		*<0,02*	0.003	0.003	0.002	64.8	4
	mg/kg	LT1F5					*<0,02*	0.004	0.004	0.005	101.8	4
	mg/kg	LT1F6					*<0,02*	0.007	0.012	0.016	125.5	3
	mg/kg	LT1F7					*<0,02*	0.008	0.019	0.027	137.7	3
	mg/kg	LT1LS_2			0.016		*<0,02*	0.016	0.023	0.019	84.0	4
	mg/kg	LT1LS10			0.052		*<0,02*	0.052	0.055	0.044	80.4	3
Se	mg/kg	LT1F2			0.049		*0,1438*	0.049	0.056	0.037	65.9	4
	mg/kg	LT1F3			0.047		0.048	0.047	0.049	0.018	37.3	6
	mg/kg	LT1F4			0.016		*<0,02*	0.016	0.014	0.010	68.2	4
	mg/kg	LT1F5					*<0,02*	0.01	0.03	0.04	139.8	3
	mg/kg	LT1F6					*<0,02*	0.01	0.01	0.02	145.7	2
	mg/kg	LT1F7					*<0,02*	0.03	0.03	0.03	135.3	2
	mg/kg	LT1LS_2		-0.77	0.25	50	0.20	0.25	0.27	0.09	34.7	6
	mg/kg	LT1LS10		-1.22	0.29	50	0.20	0.29	0.28	0.10	35.4	6
SO_4	mg/kg	LT1F2			2700		*6131,8407*	2700	2941	971	33.0	6
	mg/kg	LT1F3			17200		17239	17200	16348	1448	8.9	5
	mg/kg	LT1F4			5559		4416	5559	5103	2688	52.7	6
	mg/kg	LT1F5			33.3		34.6	33.3	49.4	45.9	93.1	4
	mg/kg	LT1F6			11.1		10.0	11.1	11.2	5.1	45.5	4
	mg/kg	LT1F7			5.55		3.87	5.55	5.24	1.24	23.7	3
	mg/kg	LT1LS_2		0.40	26755	20	27822	27680	26755	1512	5.7	5
	mg/kg	LT1LS10		0.26	27123	20	27836	27700	27123	1059	3.9	5
V	mg/kg	LT1F2			3.62		*8,0941*	3.62	4.04	2.35	58.3	5
	mg/kg	LT1F3			5.59		6.13	5.59	5.23	1.62	31.0	6
	mg/kg	LT1F4			1.62		1.23	1.62	2.20	1.93	87.8	6
	mg/kg	LT1F5			0.16		0.17	0.16	0.14	0.05	37.3	4
	mg/kg	LT1F6			0.087		0.087	0.087	0.078	0.036	46.4	5
	mg/kg	LT1F7			0.029		0.025	0.029	0.035	0.012	34.7	5
	mg/kg	LT1LS_2		-0.76	19.3	50	15.6	19.3	19.4	6.0	31.1	6
	mg/kg	LT1LS10		-0.91	20.4	50	15.7	20.4	19.9	6.1	30.5	6

Participant 1												
Measurand	Unit	Sample	-3 0 3	z score	Assigned value	2×s_{pt} %	Participant's result	Md	Mean	sd	sd %	n (stat)
Zn	mg/kg	LT1F2			25.2		*36,8752*	25.2	23.7	15.5	65.2	6
	mg/kg	LT1F3			24.7		24.7	24.7	21.9	13.5	61.8	7
	mg/kg	LT1F4			4.89		0.30	4.89	6.39	7.15	111.9	7
	mg/kg	LT1F5			0.22		0.22	0.22	0.27	0.15	53.8	5
	mg/kg	LT1F6			0.036		0.023	0.036	0.039	0.016	40.5	4
	mg/kg	LT1F7					*<0,02*	0.08	0.22	0.27	119.2	3
	mg/kg	LT1LS_2		-1.32	92.7	50	62.1	92.7	82.7	36.9	44.6	7
	mg/kg	LT1LS10		-1.32	92.7	50	62.2	92.7	83.1	36.6	44.0	7

Participant 2												
Measurand	Unit	Sample	-3 0 3	z score	Assigned value	2×s_{pt} %	Participant's result	Md	Mean	sd	sd %	n (stat)
As	mg/kg	LT1F6					*<0.018*	0.02	0.02	0.02	141.3	2
	mg/kg	LT1F7					*<0.030*	0.02	0.02	0.04	141.7	2
Ba	mg/kg	LT1F6			0.75		*<0.039*	0.75	0.92	0.46	49.7	7
	mg/kg	LT1F7			3.01		1.46	3.01	2.54	1.02	40.1	8
Cd	mg/kg	LT1F6					*<0.001*	0.0009	0.0029	0.0043	147.0	3
	mg/kg	LT1F7					*<0.001*	0.002	0.003	0.004	124.6	3
Conductivity 25	mS/m	LT1F1			35100		60700	35100	31336	7820	25.0	5
	mS/m	LT1F2			34000		50600	34000	38207	19053	49.9	7
	mS/m	LT1F3			24000		32185	24000	23066	5665	24.6	7
	mS/m	LT1F4			13190		19275	13190	12617	4896	38.8	8
	mS/m	LT1F5			2245		5700	2245	2122	771	36.4	6
	mS/m	LT1F6			415		885	415	388	106	27.4	6
	mS/m	LT1F7			204		225	204	206	24	11.5	6
Cr	mg/kg	LT1F1			2.90		2.01	2.90	2.46	1.11	45.1	7
	mg/kg	LT1F2			1.13		1.57	1.13	1.19	0.69	58.0	6
	mg/kg	LT1F3			1.70		2.35	1.70	1.65	0.49	29.9	7
	mg/kg	LT1F4			0.70		1.71	0.70	0.91	0.70	76.4	7
	mg/kg	LT1F5			0.038		0.878	0.038	0.048	0.033	68.0	5
	mg/kg	LT1F6			0.017		0.130	0.017	0.015	0.008	56.3	5
	mg/kg	LT1F7			0.013		*<0.032*	0.013	0.014	0.008	52.5	3
	mg/kg	LT1LS_2		1.34	6.38	50	8.52	6.38	6.41	2.02	31.5	7
	mg/kg	LT1LS10		1.16	6.73	50	8.69	6.73	6.51	2.04	31.4	7
Cu	mg/kg	LT1F6					*<0.027*	0.003	0.008	0.011	141.8	3
	mg/kg	LT1F7					*<0.046*	0.03	0.04	0.04	111.2	3
Mo	mg/kg	LT1F1			0.92		0.73	0.92	0.86	0.45	52.5	7
	mg/kg	LT1F2			0.27		0.59	0.27	0.33	0.21	64.9	6
	mg/kg	LT1F3			0.20		0.83	0.20	0.18	0.05	26.3	5
	mg/kg	LT1F4			0.05		0.63	0.05	0.06	0.04	63.0	5
	mg/kg	LT1F5			0.01		0.26	0.01	0.01	0.01	59.0	4
	mg/kg	LT1F6			0.003		0.100	0.003	0.003	0.002	81.7	4
	mg/kg	LT1F7					0.021	0.013	0.019	0.022	118.3	4
	mg/kg	LT1LS_2		2.35	1.91	50	3.03	1.91	1.77	0.76	42.9	7
	mg/kg	LT1LS10		2.31	2.00	50	3.16	2.00	1.81	0.79	43.5	7
Ni	mg/kg	LT1F6					*<0.012*	0.0015	0.0015	0.0021	132.9	2
	mg/kg	LT1F7					*<0.020*	0.003	0.003	0.003	121.9	2
Pb	mg/kg	LT1F6					*<0.030*	0.002	0.002	0.001	86.4	3
	mg/kg	LT1F7					*<0.050*	0.003	0.003	0.003	129.2	2

Participant 2													
Measurand	Unit	Sample	-3 0 3	z score	Assigned value	2×s_{pt} %	Participant's result	Md	Mean	sd	sd %	n (stat)
pH		LT1F1		0.12	13.8	3,6	13.8	13.8	13.8	0.3	2.2	7
		LT1F2		-0.20	13.8	3,6	13.8	13.8	13.7	0.3	2.1	7
		LT1F3		0.00	13.6	3,7	13.6	13.6	13.5	0.3	2.0	8
		LT1F4		-0.44	13.1	3,8	13.0	13.1	13.2	0.4	2.7	8
		LT1F5		0.96	12.8	3,9	13.0	13.0	12.8	0.3	2.7	8
		LT1F6		-1.73	12.1	4,1	11.7	12.1	12.1	0.3	2.6	8
		LT1F7		-2.73	11.6	4,3	10.9	11.8	11.6	0.5	4.2	8
Se	mg/kg	LT1F6					*<0.009*	0.01	0.01	0.02	145.7	2
	mg/kg	LT1F7					*<0.015*	0.03	0.03	0.03	135.3	2
Zn	mg/kg	LT1F1			38.6		27.5	38.6	33.5	17.4	51.9	7
	mg/kg	LT1F2			25.2		21.3	25.2	23.7	15.5	65.2	6
	mg/kg	LT1F3			24.7		31.3	24.7	21.9	13.5	61.8	7
	mg/kg	LT1F4			4.89		17.96	4.89	6.39	7.15	111.9	7
	mg/kg	LT1F5			0.22		3.33	0.22	0.27	0.15	53.8	5
	mg/kg	LT1F6			0.036		*<0.188*	0.036	0.039	0.016	40.5	4
	mg/kg	LT1F7					*<0.314*	0.08	0.22	0.27	119.2	3
	mg/kg	LT1LS_2		0.38	92.7	50	101.4	92.7	82.7	36.9	44.6	7
	mg/kg	LT1LS10		0.40	92.7	50	101.9	92.7	83.1	36.6	44.0	7

Participant 3												
Measurand	Unit	Sample	-3 0 3	z score	Assigned value	2×s_{pt} %	Participant's result	Md	Mean	sd	sd %	n (stat)
As	mg/kg	LT1F1			0.31		0.52	0.26	0.31	0.14	45.7	5
	mg/kg	LT1F2			0.066		0.066	0.066	0.096	0.074	76.7	5
	mg/kg	LT1F3			0.11		0.12	0.11	0.10	0.05	46.9	6
	mg/kg	LT1F4			0.013		0.018	0.013	0.017	0.016	96.3	4
	mg/kg	LT1F5					*<0,001*	0.005	0.005	0.005	98.5	3
	mg/kg	LT1F6					*<0,003*	0.02	0.02	0.02	141.3	2
	mg/kg	LT1F7					*<0,005*	0.02	0.02	0.04	141.7	2
	mg/kg	LT1LS_2		2.18	0.46	50	0.71	0.46	0.49	0.20	40.4	6
	mg/kg	LT1LS10		1.70	0.50	50	0.71	0.50	0.50	0.20	39.4	6
Ba	mg/kg	LT1F1			0.15		0.06	0.15	0.16	0.08	49.0	6
	mg/kg	LT1F2			0.11		0.01	0.11	0.12	0.08	68.0	6
	mg/kg	LT1F3			0.21		0.14	0.21	0.25	0.10	42.4	7
	mg/kg	LT1F4			0.14		0.18	0.14	0.14	0.06	44.8	6
	mg/kg	LT1F5			0.18		0.06	0.18	0.19	0.15	76.2	6
	mg/kg	LT1F6			0.75		0.45	0.75	0.92	0.46	49.7	7
	mg/kg	LT1F7			3.01		2.89	3.01	2.54	1.02	40.1	8
	mg/kg	LT1LS_2		-2.02	0.92	50	0.46	0.92	0.86	0.22	26.1	6
	mg/kg	LT1LS10		-1.03	5.12	50	3.80	5.12	4.75	1.23	25.9	6
Cd	mg/kg	LT1F1			0.0008		0.0012	0.0008	0.0008	0.0005	59.2	4
	mg/kg	LT1F2			0.0009		0.0009	0.0009	0.0008	0.0005	58.8	4
	mg/kg	LT1F3			0.0006		0.0006	0.0006	0.0009	0.0006	60.3	3
	mg/kg	LT1F4					*<0,0001*	0.002	0.003	0.004	126.8	3
	mg/kg	LT1F5					*<0,0002*	0.000	0.003	0.004	163.6	3
	mg/kg	LT1F6					*<0,0006*	0.0009	0.0029	0.0043	147.0	3
	mg/kg	LT1F7					*<0,001*	0.002	0.003	0.004	124.6	3
	mg/kg	LT1LS_2			0.004		0.003	0.003	0.004	0.002	51.1	3
	mg/kg	LT1LS10					*<0,005*	0.005	0.005	0.004	78.8	2

Participant 3												
Measurand	Unit	Sample	-3 0 3	z score	Assigned value	2×s_{pt} %	Participant's result	Md	Mean	sd	sd %	n (stat)
Cl	mg/kg	LT1F1			1233		1610	1233	1078	530	49.2	6
	mg/kg	LT1F2			617		748	617	469	307	65.5	5
	mg/kg	LT1F3			217		217	217	271	163	59.9	6
	mg/kg	LT1F4			19.6		14.0	19.6	21.9	14.1	64.4	5
	mg/kg	LT1F5			4.80		*<5*	4.80	4.49	2.10	46.8	4
	mg/kg	LT1F6			2.77		*<15*	2.77	3.64	2.46	67.6	4
	mg/kg	LT1F7			2.35		*<25*	2.35	2.29	0.45	19.8	4
	mg/kg	LT1LS_2		0.99	2079	50	2593	2079	1957	615	31.4	6
	mg/kg	LT1LS10		0.91	2116	50	2599	2116	1974	616	31.2	6
Conductivity 25	mS/m	LT1F1			35100		97000	35100	31336	7820	25.0	5
	mS/m	LT1F2			34000		74900	34000	38207	19053	49.9	7
	mS/m	LT1F3			24000		54700	24000	23066	5665	24.6	7
	mS/m	LT1F4			13190		16200	13190	12617	4896	38.8	8
	mS/m	LT1F5			2245		2110	2245	2122	771	36.4	6
	mS/m	LT1F6			415		480	415	388	106	27.4	6
	mS/m	LT1F7			204		184	204	206	24	11.5	6
Cr	mg/kg	LT1F1			2.90		3.40	2.90	2.46	1.11	45.1	7
	mg/kg	LT1F2			1.13		0.87	1.13	1.19	0.69	58.0	6
	mg/kg	LT1F3			1.70		1.60	1.70	1.65	0.49	29.9	7
	mg/kg	LT1F4			0.70		0.51	0.70	0.91	0.70	76.4	7
	mg/kg	LT1F5			0.038		0.036	0.038	0.048	0.033	68.0	5
	mg/kg	LT1F6			0.017		0.019	0.017	0.015	0.008	56.3	5
	mg/kg	LT1F7			0.013		0.013	0.013	0.014	0.008	52.5	3
	mg/kg	LT1LS_2		0.00	6.38	50	6.38	6.38	6.41	2.02	31.5	7
	mg/kg	LT1LS10		-0.19	6.73	50	6.41	6.73	6.51	2.04	31.4	7
Cu	mg/kg	LT1F1			0.016		0.004	0.016	0.016	0.012	73.3	5
	mg/kg	LT1F2					0.005	0.004	0.007	0.010	132.5	4
	mg/kg	LT1F3			0.018		0.020	0.018	0.014	0.009	62.2	5
	mg/kg	LT1F4			0.005		0.010	0.005	0.005	0.004	75.4	4
	mg/kg	LT1F5					0.005	0.005	0.004	0.003	75.3	3
	mg/kg	LT1F6					0.003	0.003	0.008	0.011	141.8	3
	mg/kg	LT1F7					*<0,01*	0.03	0.04	0.04	111.2	3
	mg/kg	LT1LS_2			0.044		0.044	0.044	0.047	0.028	58.8	5
	mg/kg	LT1LS10		-0.10	0.054	50	0.053	0.054	0.058	0.021	35.7	5
DOC	mg/kg	LT1F1			13.8		14.6	13.8	14.6	3.3	22.4	4
	mg/kg	LT1F2			6.87		2.72	6.87	10.69	8.00	74.8	5
	mg/kg	LT1F3			7.73		3.42	7.73	9.99	7.01	70.2	5
	mg/kg	LT1F4			5.59		2.20	5.59	5.10	2.12	41.5	5
	mg/kg	LT1F5			4.03		*<5*	4.03	3.57	1.75	49.1	4
	mg/kg	LT1F6			3.59		*<15*	3.59	4.37	3.37	77.2	4
	mg/kg	LT1F7			5.83		*<25*	4.29	8.12	9.76	120.3	4
	mg/kg	LT1LS_2			40.1		22.6	40.1	45.2	23.7	52.4	4
	mg/kg	LT1LS10			54.7		*<50*	54.7	58.9	22.8	38.7	3
F	mg/kg	LT1F1			1.18		1.17	1.18	1.17	0.11	9.4	5
	mg/kg	LT1F2			0.88		1.23	0.88	0.78	0.46	59.3	4
	mg/kg	LT1F3			1.76		2.35	1.76	1.84	0.92	49.9	5
	mg/kg	LT1F4			1.19		1.63	1.19	1.08	0.56	51.8	4
	mg/kg	LT1F5			0.48		0.45	0.48	0.50	0.18	35.3	5

Participant 3												
Measurand	Unit	Sample	-3 0 3	z score	Assigned value	2×s_{pt} %	Participant's result	Md	Mean	sd	sd %	n (stat)
F, cont'd	mg/kg	LT1F6			0.49		*<0,6*	0.49	0.50	0.21	43.0	4
	mg/kg	LT1F7					*<1*	0.32	0.52	0.42	79.7	3
	mg/kg	LT1LS_2			5.43		6.85	5.43	6.18	2.98	48.3	5
	mg/kg	LT1LS10			6.43		7.76	6.43	7.18	3.35	46.6	5
Hg	mg/kg	LT1F1					0.0029	0.0000	0.0000	0.0000	88.2	3
	mg/kg	LT1F2					0.0010	0.0000	0.0000	0.0000	58.9	3
	mg/kg	LT1F3					0.0012	0.0001	0.0001	0.0000	35.5	3
	mg/kg	LT1F4					0.0005	0.0001	0.0002	0.0002	103.5	4
	mg/kg	LT1F5					*<0,0004*	0.0002	0.0001	0.0001	81.2	3
	mg/kg	LT1F6					*<0,0012*	0.0002	0.0003	0.0003	106.6	3
	mg/kg	LT1F7					*<0,002*	0.0003	0.0004	0.0005	115.7	3
	mg/kg	LT1LS_2					0.0055	0.0004	0.0020	0.0030	147.1	3
	mg/kg	LT1LS10					0.006	0.002	0.003	0.003	104.6	3
Mo	mg/kg	LT1F1			0.92		1.57	0.92	0.86	0.45	52.5	7
	mg/kg	LT1F2			0.27		0.21	0.27	0.33	0.21	64.9	6
	mg/kg	LT1F3			0.20		0.20	0.20	0.18	0.05	26.3	5
	mg/kg	LT1F4			0.05		0.05	0.05	0.06	0.04	63.0	5
	mg/kg	LT1F5			0.01		0.01	0.01	0.01	0.01	59.0	4
	mg/kg	LT1F6			0.003		0.004	0.003	0.003	0.002	81.7	4
	mg/kg	LT1F7					*<0,005*	0.013	0.019	0.022	118.3	4
	mg/kg	LT1LS_2		0.29	1.91	50	2.05	1.91	1.77	0.76	42.9	7
	mg/kg	LT1LS10		0.10	2.00	50	2.05	2.00	1.81	0.79	43.5	7
Ni	mg/kg	LT1F1					*<0,0005*	0.001	0.001	0.001	57.5	3
	mg/kg	LT1F2					*<0,0005*	0.0009	0.0012	0.0007	54.5	3
	mg/kg	LT1F3					*<0,001*	0.004	0.004	0.003	82.1	3
	mg/kg	LT1F4					*<0,001*	0.0003	0.0003	0.0003	117.4	2
	mg/kg	LT1F5					*<0,001*	0.0005	0.0005	0.0006	117.8	2
	mg/kg	LT1F6					*<0,003*	0.0015	0.0015	0.0021	132.9	2
	mg/kg	LT1F7					*<0,005*	0.003	0.003	0.003	121.9	2
	mg/kg	LT1LS_2					*<0,004*	0.007	0.007	0.004	63.7	2
	mg/kg	LT1LS10					*<0,02*	0.01	0.01	0.00	8.2	2
Pb	mg/kg	LT1F1			0.045		0.04	0.05	0.05	0.02	34.7	4
	mg/kg	LT1F2			0.031		0.024	0.031	0.031	0.019	59.4	4
	mg/kg	LT1F3			0.035		0.063	0.035	0.033	0.020	61.9	5
	mg/kg	LT1F4			0.005		0.009	0.005	0.005	0.003	66.3	4
	mg/kg	LT1F5					0.002	0.001	0.001	0.001	70.4	3
	mg/kg	LT1F6					*<0,002*	0.002	0.002	0.001	86.4	3
	mg/kg	LT1F7					*<0,002*	0.003	0.003	0.003	129.2	2
	mg/kg	LT1LS_2		0.22	0.13	50	0.14	0.13	0.11	0.04	33.7	5
	mg/kg	LT1LS10		-0.09	0.14	50	0.14	0.14	0.11	0.04	33.8	5
pH		LT1F1		0.40	13.8	3,6	13.9	13.8	13.8	0.3	2.2	7
		LT1F2		0.40	13.8	3,6	13.9	13.8	13.7	0.3	2.1	7
		LT1F3		0.40	13.6	3,7	13.7	13.6	13.5	0.3	2.0	8
		LT1F4		1.21	13.1	3,8	13.4	13.1	13.2	0.4	2.7	8
		LT1F5		0.80	12.8	3,9	13.0	13.0	12.8	0.3	2.7	8
		LT1F6		1.21	12.1	4,1	12.4	12.1	12.1	0.3	2.6	8
		LT1F7		1.60	11.6	4,3	12.0	11.8	11.6	0.5	4.2	8

Participant 3												
Measurand	Unit	Sample	-3 0 3	z score	Assigned value	2×s_{pt} %	Participant's result	Md	Mean	sd	sd %	n (stat)
Sb	mg/kg	LT1F1			0.001		0.001	0.001	0.001	0.000	3.2	3
	mg/kg	LT1F2			0.001		0.001	0.001	0.001	0.001	38.0	4
	mg/kg	LT1F3			0.004		0.003	0.003	0.003	0.001	16.6	4
	mg/kg	LT1F4			0.003		0.003	0.003	0.003	0.002	64.8	4
	mg/kg	LT1F5					*<0,001*	0.004	0.004	0.005	101.8	4
	mg/kg	LT1F6					*<0,003*	0.007	0.012	0.016	125.5	3
	mg/kg	LT1F7					*<0,005*	0.008	0.019	0.027	137.7	3
	mg/kg	LT1LS_2			0.016		0.009	0.016	0.023	0.019	84.0	4
	mg/kg	LT1LS10			0.052		*<0,015*	0.052	0.055	0.044	80.4	3
Se	mg/kg	LT1F1			0.16		0.27	0.16	0.17	0.06	34.9	5
	mg/kg	LT1F2			0.049		0.042	0.049	0.056	0.037	65.9	4
	mg/kg	LT1F3			0.047		0.053	0.047	0.049	0.018	37.3	6
	mg/kg	LT1F4			0.016		0.018	0.016	0.014	0.010	68.2	4
	mg/kg	LT1F5					*<0,004*	0.01	0.03	0.04	139.8	3
	mg/kg	LT1F6					*<0,012*	0.01	0.01	0.02	145.7	2
	mg/kg	LT1F7					*<0,02*	0.03	0.03	0.03	135.3	2
	mg/kg	LT1LS_2		2.08	0.25	50	0.38	0.25	0.27	0.09	34.7	6
	mg/kg	LT1LS10		1.24	0.29	50	0.38	0.29	0.28	0.10	35.4	6
SO_4	mg/kg	LT1F1			1869		674	1869	1960	925	47.2	6
	mg/kg	LT1F2			2700		1590	2700	2941	971	33.0	6
	mg/kg	LT1F3			17200		17740	17200	16348	1448	8.9	5
	mg/kg	LT1F4			5559		7670	5559	5103	2688	52.7	6
	mg/kg	LT1F5			33.3		32.0	33.3	49.4	45.9	93.1	4
	mg/kg	LT1F6			11.1		*<15*	11.1	11.2	5.1	45.5	4
	mg/kg	LT1F7			5.55		*<25*	5.55	5.24	1.24	23.7	3
	mg/kg	LT1LS_2		0.35	26755	20	27680	27680	26755	1512	5.7	5
	mg/kg	LT1LS10		0.21	27123	20	27700	27700	27123	1059	3.9	5
V	mg/kg	LT1F1			8.66		11.10	8.66	7.78	3.73	48.0	6
	mg/kg	LT1F2			3.62		3.62	3.62	4.04	2.35	58.3	5
	mg/kg	LT1F3			5.59		6.84	5.59	5.23	1.62	31.0	6
	mg/kg	LT1F4			1.62		1.39	1.62	2.20	1.93	87.8	6
	mg/kg	LT1F5			0.16		0.15	0.16	0.14	0.05	37.3	4
	mg/kg	LT1F6			0.087		0.088	0.087	0.078	0.036	46.4	5
	mg/kg	LT1F7			0.029		0.029	0.029	0.035	0.012	34.7	5
	mg/kg	LT1LS_2		0.79	19.3	50	23.1	19.3	19.4	6.0	31.1	6
	mg/kg	LT1LS10		0.55	20.4	50	23.2	20.4	19.9	6.1	30.5	6
Zn	mg/kg	LT1F1			38.6		54.5	38.6	33.5	17.4	51.9	7
	mg/kg	LT1F2			25.2		38.9	25.2	23.7	15.5	65.2	6
	mg/kg	LT1F3			24.7		40.0	24.7	21.9	13.5	61.8	7
	mg/kg	LT1F4			4.89		4.89	4.89	6.39	7.15	111.9	7
	mg/kg	LT1F5			0.22		0.20	0.22	0.27	0.15	53.8	5
	mg/kg	LT1F6			0.036		0.039	0.036	0.039	0.016	40.5	4
	mg/kg	LT1F7					*<0,02*	0.08	0.22	0.27	119.2	3
	mg/kg	LT1LS_2		1.95	92.7	50	138.0	92.7	82.7	36.9	44.6	7
	mg/kg	LT1LS10		1.95	92.7	50	138.0	92.7	83.1	36.6	44.0	7

Participant 4												
Measurand	Unit	Sample	-3 0 3	z score	Assigned value	2×s_{pt} %	Participant's result	Md	Mean	sd	sd %	n (stat)
As	mg/kg	LT1F1			0.31		0.25	0.26	0.31	0.14	45.7	5
	mg/kg	LT1F2			0.066		0.364	0.066	0.096	0.074	76.7	5
	mg/kg	LT1F3			0.11		0.47	0.11	0.10	0.05	46.9	6
	mg/kg	LT1F4			0.013		0.512	0.013	0.017	0.016	96.3	4
	mg/kg	LT1F5					0.514	0.005	0.005	0.005	98.5	3
	mg/kg	LT1F6					0.52	0.02	0.02	0.02	141.3	2
	mg/kg	LT1F7					0.52	0.02	0.02	0.04	141.7	2
Ba	mg/kg	LT1F1			0.15		0.13	0.15	0.16	0.08	49.0	6
	mg/kg	LT1F2			0.11		0.16	0.11	0.12	0.08	68.0	6
	mg/kg	LT1F3			0.21		0.18	0.21	0.25	0.10	42.4	7
	mg/kg	LT1F4			0.14		0.38	0.14	0.14	0.06	44.8	6
	mg/kg	LT1F5			0.18		0.47	0.18	0.19	0.15	76.2	6
	mg/kg	LT1F6			0.75		0.63	0.75	0.92	0.46	49.7	7
	mg/kg	LT1F7			3.01		1.31	3.01	2.54	1.02	40.1	8
Cd	mg/kg	LT1F1			0.0008		0.0047	0.0008	0.0008	0.0005	59.2	4
	mg/kg	LT1F2			0.0009		0.0059	0.0009	0.0008	0.0005	58.8	4
	mg/kg	LT1F3			0.0006		0.0068	0.0006	0.0009	0.0006	60.3	3
	mg/kg	LT1F4					0.008	0.002	0.003	0.004	126.8	3
	mg/kg	LT1F5					0.008	0.000	0.003	0.004	163.6	3
	mg/kg	LT1F6					0.0078	0.0009	0.0029	0.0043	147.0	3
	mg/kg	LT1F7					0.008	0.002	0.003	0.004	124.6	3
Cl	mg/kg	LT1F1			1233		1150	1233	1078	530	49.2	6
	mg/kg	LT1F2			617		1650	617	469	307	65.5	5
	mg/kg	LT1F3			217		2110	217	271	163	59.9	6
	mg/kg	LT1F4			19.6		2360.0	19.6	21.9	14.1	64.4	5
	mg/kg	LT1F5			4.80		2360.00	4.80	4.49	2.10	46.8	4
	mg/kg	LT1F6			2.77		2370.00	2.77	3.64	2.46	67.6	4
	mg/kg	LT1F7			2.35		2370.00	2.35	2.29	0.45	19.8	4
Conductivity 25	mS/m	LT1F1			35100		35100	35100	31336	7820	25.0	5
	mS/m	LT1F2			34000		32100	34000	38207	19053	49.9	7
	mS/m	LT1F3			24000		26000	24000	23066	5665	24.6	7
	mS/m	LT1F4			13190		14380	13190	12617	4896	38.8	8
	mS/m	LT1F5			2245		2950	2245	2122	771	36.4	6
	mS/m	LT1F6			415		396	415	388	106	27.4	6
	mS/m	LT1F7			204		57	204	206	24	11.5	6
Cr	mg/kg	LT1F1			2.90		2.90	2.90	2.46	1.11	45.1	7
	mg/kg	LT1F2			1.13		4.25	1.13	1.19	0.69	58.0	6
	mg/kg	LT1F3			1.70		6.02	1.70	1.65	0.49	29.9	7
	mg/kg	LT1F4			0.70		7.14	0.70	0.91	0.70	76.4	7
	mg/kg	LT1F5			0.038		7.200	0.038	0.048	0.033	68.0	5
	mg/kg	LT1F6			0.017		7.210	0.017	0.015	0.008	56.3	5
	mg/kg	LT1F7			0.013		7.220	0.013	0.014	0.008	52.5	3
Cu	mg/kg	LT1F1			0.016		0.028	0.016	0.016	0.012	73.3	5
	mg/kg	LT1F2					0.040	0.004	0.007	0.010	132.5	4
	mg/kg	LT1F3			0.018		0.058	0.018	0.014	0.009	62.2	5
	mg/kg	LT1F4			0.005		0.083	0.005	0.005	0.004	75.4	4
	mg/kg	LT1F5					0.085	0.005	0.004	0.003	75.3	3
	mg/kg	LT1F6					0.086	0.003	0.008	0.011	141.8	3

Participant 4												
Measurand	Unit	Sample	-3 0 3	z score	Assigned value	2×s_{pt} %	Participant's result	Md	Mean	sd	sd %	n (stat)
Cu, cont'd	mg/kg	LT1F7					0.09	0.03	0.04	0.04	111.2	3
DOC	mg/kg	LT1F1			13.8		11.5	13.8	14.6	3.3	22.4	4
	mg/kg	LT1F2			6.87		15.90	6.87	10.69	8.00	74.8	5
	mg/kg	LT1F3			7.73		21.90	7.73	9.99	7.01	70.2	5
	mg/kg	LT1F4			5.59		25.60	5.59	5.10	2.12	41.5	5
	mg/kg	LT1F5			4.03		26.35	4.03	3.57	1.75	49.1	4
	mg/kg	LT1F6			3.59		27.95	3.59	4.37	3.37	77.2	4
	mg/kg	LT1F7			5.83		29.20	4.29	8.12	9.76	120.3	4
F	mg/kg	LT1F1			1.18		1.18	1.18	1.17	0.11	9.4	5
	mg/kg	LT1F2			0.88		2.10	0.88	0.78	0.46	59.3	4
	mg/kg	LT1F3			1.76		4.86	1.76	1.84	0.92	49.9	5
	mg/kg	LT1F4			1.19		10.00	1.19	1.08	0.56	51.8	4
	mg/kg	LT1F5			0.48		10.85	0.48	0.50	0.18	35.3	5
	mg/kg	LT1F6			0.49		11.37	0.49	0.50	0.21	43.0	4
	mg/kg	LT1F7					11.47	0.32	0.52	0.42	79.7	3
Hg	mg/kg	LT1F1					0.0000	0.0000	0.0000	0.0000	88.2	3
	mg/kg	LT1F2					0.0001	0.0000	0.0000	0.0000	58.9	3
	mg/kg	LT1F3					0.0001	0.0001	0.0001	0.0000	35.5	3
	mg/kg	LT1F4					0.0002	0.0001	0.0002	0.0002	103.5	4
	mg/kg	LT1F5					0.0002	0.0002	0.0001	0.0001	81.2	3
	mg/kg	LT1F6					0.0002	0.0002	0.0003	0.0003	106.6	3
	mg/kg	LT1F7					0.0003	0.0003	0.0004	0.0005	115.7	3
Mo	mg/kg	LT1F1			0.92		0.92	0.92	0.86	0.45	52.5	7
	mg/kg	LT1F2			0.27		1.33	0.27	0.33	0.21	64.9	6
	mg/kg	LT1F3			0.20		1.69	0.20	0.18	0.05	26.3	5
	mg/kg	LT1F4			0.05		1.88	0.05	0.06	0.04	63.0	5
	mg/kg	LT1F5			0.01		1.89	0.01	0.01	0.01	59.0	4
	mg/kg	LT1F6			0.003		0.000	0.003	0.003	0.002	81.7	4
	mg/kg	LT1F7					0.000	0.013	0.019	0.022	118.3	4
Ni	mg/kg	LT1F1					0.001	0.001	0.001	0.001	57.5	3
	mg/kg	LT1F2					0.0008	0.0009	0.0012	0.0007	54.5	3
	mg/kg	LT1F3					0.004	0.004	0.004	0.003	82.1	3
	mg/kg	LT1F4					0.0077	0.0003	0.0003	0.0003	117.4	2
	mg/kg	LT1F5					0.0079	0.0005	0.0005	0.0006	117.8	2
	mg/kg	LT1F6					0.0087	0.0015	0.0015	0.0021	132.9	2
	mg/kg	LT1F7					0.010	0.003	0.003	0.003	121.9	2
Pb	mg/kg	LT1F1			0.045		0.28	0.05	0.05	0.02	34.7	4
	mg/kg	LT1F2			0.031		0.360	0.031	0.031	0.019	59.4	4
	mg/kg	LT1F3			0.035		0.451	0.035	0.033	0.020	61.9	5
	mg/kg	LT1F4			0.005		0.489	0.005	0.005	0.003	66.3	4
	mg/kg	LT1F5					0.496	0.001	0.001	0.001	70.4	3
	mg/kg	LT1F6					0.497	0.002	0.002	0.001	86.4	3
	mg/kg	LT1F7					0.498	0.003	0.003	0.003	129.2	2
pH		LT1F1		2.13	13.8	3,6	14.3	13.8	13.8	0.3	2.2	7
		LT1F2		0.93	13.8	3,6	14.0	13.8	13.7	0.3	2.1	7
		LT1F3		1.15	13.6	3,7	13.9	13.6	13.5	0.3	2.0	8
		LT1F4		1.69	13.1	3,8	13.5	13.1	13.2	0.4	2.7	8
		LT1F5		0.92	12.8	3,9	13.0	13.0	12.8	0.3	2.7	8

Participant 4												
Measurand	Unit	Sample	-3 0 3	z score	Assigned value	2×s_{pt} %	Participant's result	Md	Mean	sd	sd %	n (stat)
pH, cont'd		LT1F6		0.00	12.1	4,1	12.1	12.1	12.1	0.3	2.6	8
		LT1F7		-3.41	11.6	4,3	10.8	11.8	11.6	0.5	4.2	8
Sb	mg/kg	LT1F1			0.001		0.001	0.001	0.001	0.000	3.2	3
	mg/kg	LT1F2			0.001		0.002	0.001	0.001	0.001	38.0	4
	mg/kg	LT1F3			0.004		0.004	0.003	0.003	0.001	16.6	4
	mg/kg	LT1F4			0.003		0.006	0.003	0.003	0.002	64.8	4
	mg/kg	LT1F5					0.006	0.004	0.004	0.005	101.8	4
	mg/kg	LT1F6					0.007	0.007	0.012	0.016	125.5	3
	mg/kg	LT1F7					0.008	0.008	0.019	0.027	137.7	3
Se	mg/kg	LT1F1			0.16		0.14	0.16	0.17	0.06	34.9	5
	mg/kg	LT1F2			0.049		0.196	0.049	0.056	0.037	65.9	4
	mg/kg	LT1F3			0.047		0.251	0.047	0.049	0.018	37.3	6
	mg/kg	LT1F4			0.016		0.273	0.016	0.014	0.010	68.2	4
	mg/kg	LT1F5					0.28	0.01	0.03	0.04	139.8	3
	mg/kg	LT1F6					0.28	0.01	0.01	0.02	145.7	2
	mg/kg	LT1F7					0.29	0.03	0.03	0.03	135.3	2
SO_4	mg/kg	LT1F1			1869		1830	1869	1960	925	47.2	6
	mg/kg	LT1F2			2700		4050	2700	2941	971	33.0	6
	mg/kg	LT1F3			17200		17200	17200	16348	1448	8.9	5
	mg/kg	LT1F4			5559		26200	5559	5103	2688	52.7	6
	mg/kg	LT1F5			33.3		26400.0	33.3	49.4	45.9	93.1	4
	mg/kg	LT1F6			11.1		26400.0	11.1	11.2	5.1	45.5	4
	mg/kg	LT1F7			5.55		26400.00	5.55	5.24	1.24	23.7	3
V	mg/kg	LT1F1			8.66		8.95	8.66	7.78	3.73	48.0	6
	mg/kg	LT1F2			3.62		13.80	3.62	4.04	2.35	58.3	5
	mg/kg	LT1F3			5.59		19.80	5.59	5.23	1.62	31.0	6
	mg/kg	LT1F4			1.62		22.40	1.62	2.20	1.93	87.8	6
	mg/kg	LT1F5			0.16		22.70	0.16	0.14	0.05	37.3	4
	mg/kg	LT1F6			0.087		22.800	0.087	0.078	0.036	46.4	5
	mg/kg	LT1F7			0.029		22.900	0.029	0.035	0.012	34.7	5
Zn	mg/kg	LT1F1			38.6		42.2	38.6	33.5	17.4	51.9	7
	mg/kg	LT1F2			25.2		66.4	25.2	23.7	15.5	65.2	6
	mg/kg	LT1F3			24.7		100.0	24.7	21.9	13.5	61.8	7
	mg/kg	LT1F4			4.89		111.00	4.89	6.39	7.15	111.9	7
	mg/kg	LT1F5			0.22		112.00	0.22	0.27	0.15	53.8	5
	mg/kg	LT1F6			0.036		112.000	0.036	0.039	0.016	40.5	4
	mg/kg	LT1F7					112.00	0.08	0.22	0.27	119.2	3

Participant 5												
Measurand	Unit	Sample	-3 0 3	z score	Assigned value	2×s_{pt} %	Participant's result	Md	Mean	sd	sd %	n (stat)
As	mg/kg	LT1F1			0.31		0.26	0.26	0.31	0.14	45.7	5
	mg/kg	LT1F2			0.066		0.125	0.066	0.096	0.074	76.7	5
	mg/kg	LT1F3			0.11		0.05	0.11	0.10	0.05	46.9	6
	mg/kg	LT1F4			0.013		0.009	0.013	0.017	0.016	96.3	4
	mg/kg	LT1F5					0.010	0.005	0.005	0.005	98.5	3
	mg/kg	LT1F6					0.03	0.02	0.02	0.02	141.3	2
	mg/kg	LT1F7					0.05	0.02	0.02	0.04	141.7	2
	mg/kg	LT1LS_2		-0.05	0.46	50	0.45	0.46	0.49	0.20	40.4	6
	mg/kg	LT1LS10		0.28	0.50	50	0.53	0.50	0.50	0.20	39.4	6

Participant 5												
Measurand	Unit	Sample	-3 0 3	z score	Assigned value	2×s_{pt} %	Participant's result	Md	Mean	sd	sd %	n (stat)
Ba	mg/kg	LT1F1			0.15		0.18	0.15	0.16	0.08	49.0	6
	mg/kg	LT1F2			0.11		0.14	0.11	0.12	0.08	68.0	6
	mg/kg	LT1F3			0.21		0.34	0.21	0.25	0.10	42.4	7
	mg/kg	LT1F4			0.14		0.14	0.14	0.14	0.06	44.8	6
	mg/kg	LT1F5			0.18		0.32	0.18	0.19	0.15	76.2	6
	mg/kg	LT1F6			0.75		0.97	0.75	0.92	0.46	49.7	7
	mg/kg	LT1F7			3.01		3.60	3.01	2.54	1.02	40.1	8
	mg/kg	LT1LS_2		0.82	0.92	50	1.11	0.92	0.86	0.22	26.1	6
	mg/kg	LT1LS10		0.44	5.12	50	5.68	5.12	4.75	1.23	25.9	6
Cd	mg/kg	LT1F1			0.0008		0.0005	0.0008	0.0008	0.0005	59.2	4
	mg/kg	LT1F2			0.0009		0.0014	0.0009	0.0008	0.0005	58.8	4
	mg/kg	LT1F3			0.0006		0.0016	0.0006	0.0009	0.0006	60.3	3
	mg/kg	LT1F4					0.002	0.002	0.003	0.004	126.8	3
	mg/kg	LT1F5					0.000	0.000	0.003	0.004	163.6	3
	mg/kg	LT1F6					0.0009	0.0009	0.0029	0.0043	147.0	3
	mg/kg	LT1F7					0.002	0.002	0.003	0.004	124.6	3
	mg/kg	LT1LS_2			0.004		0.006	0.003	0.004	0.002	51.1	3
	mg/kg	LT1LS10					0.008	0.005	0.005	0.004	78.8	2
Cl	mg/kg	LT1F1			1233		1316	1233	1078	530	49.2	6
	mg/kg	LT1F2			617		617	617	469	307	65.5	5
	mg/kg	LT1F3			217		214	217	271	163	59.9	6
	mg/kg	LT1F4			19.6		31.1	19.6	21.9	14.1	64.4	5
	mg/kg	LT1F5			4.80		4.28	4.80	4.49	2.10	46.8	4
	mg/kg	LT1F6			2.77		2.97	2.77	3.64	2.46	67.6	4
	mg/kg	LT1F7			2.35		1.72	2.35	2.29	0.45	19.8	4
	mg/kg	LT1LS_2		0.20	2079	50	2181	2079	1957	615	31.4	6
	mg/kg	LT1LS10		0.13	2116	50	2186	2116	1974	616	31.2	6
Conductivity 25	mS/m	LT1F1			35100		37900	35100	31336	7820	25.0	5
	mS/m	LT1F2			34000		34200	34000	38207	19053	49.9	7
	mS/m	LT1F3			24000		21700	24000	23066	5665	24.6	7
	mS/m	LT1F4			13190		11250	13190	12617	4896	38.8	8
	mS/m	LT1F5			2245		2380	2245	2122	771	36.4	6
	mS/m	LT1F6			415		440	415	388	106	27.4	6
	mS/m	LT1F7			204		197	204	206	24	11.5	6
Cr	mg/kg	LT1F1			2.90		2.97	2.90	2.46	1.11	45.1	7
	mg/kg	LT1F2			1.13		1.38	1.13	1.19	0.69	58.0	6
	mg/kg	LT1F3			1.70		1.63	1.70	1.65	0.49	29.9	7
	mg/kg	LT1F4			0.70		0.70	0.70	0.91	0.70	76.4	7
	mg/kg	LT1F5			0.038		0.038	0.038	0.048	0.033	68.0	5
	mg/kg	LT1F6			0.017		0.007	0.017	0.015	0.008	56.3	5
	mg/kg	LT1F7			0.013		0.008	0.013	0.014	0.008	52.5	3
	mg/kg	LT1LS_2		0.21	6.38	50	6.72	6.38	6.41	2.02	31.5	7
	mg/kg	LT1LS10		0.00	6.73	50	6.73	6.73	6.51	2.04	31.4	7
Cu	mg/kg	LT1F1			0.016		0.004	0.016	0.016	0.012	73.3	5
	mg/kg	LT1F2					0.001	0.004	0.007	0.010	132.5	4
	mg/kg	LT1F3			0.018		0.002	0.018	0.014	0.009	62.2	5
	mg/kg	LT1F4			0.005		0.003	0.005	0.005	0.004	75.4	4
	mg/kg	LT1F5					0.005	0.005	0.004	0.003	75.3	3

Participant 5												
Measurand	Unit	Sample	-3 0 3	z score	Assigned value	2×s_{pt} %	Participant's result	Md	Mean	sd	sd %	n (stat)
Cu, cont'd	mg/kg	LT1F6					0.020	0.003	0.008	0.011	141.8	3
	mg/kg	LT1F7					0.03	0.03	0.04	0.04	111.2	3
	mg/kg	LT1LS_2			0.044		0.014	0.044	0.047	0.028	58.8	5
	mg/kg	LT1LS10		0.02	0.054	50	0.054	0.054	0.058	0.021	35.7	5
DOC	mg/kg	LT1F1			13.8		13.1	13.8	14.6	3.3	22.4	4
	mg/kg	LT1F2			6.87		5.94	6.87	10.69	8.00	74.8	5
	mg/kg	LT1F3			7.73		9.32	7.73	9.99	7.01	70.2	5
	mg/kg	LT1F4			5.59		6.44	5.59	5.10	2.12	41.5	5
	mg/kg	LT1F5			4.03		1.08	4.03	3.57	1.75	49.1	4
	mg/kg	LT1F6			3.59		1.30	3.59	4.37	3.37	77.2	4
	mg/kg	LT1F7			5.83		1.40	4.29	8.12	9.76	120.3	4
	mg/kg	LT1LS_2			40.1		35.9	40.1	45.2	23.7	52.4	4
	mg/kg	LT1LS10			54.7		38.5	54.7	58.9	22.8	38.7	3
F	mg/kg	LT1F1			1.18		1.00	1.18	1.17	0.11	9.4	5
	mg/kg	LT1F2			0.88		1.00	0.88	0.78	0.46	59.3	4
	mg/kg	LT1F3			1.76		3.00	1.76	1.84	0.92	49.9	5
	mg/kg	LT1F4			1.19		5.00	1.19	1.08	0.56	51.8	4
	mg/kg	LT1F5			0.48		0.68	0.48	0.50	0.18	35.3	5
	mg/kg	LT1F6			0.49		0.60	0.49	0.50	0.21	43.0	4
	mg/kg	LT1F7					1	0.32	0.52	0.42	79.7	3
	mg/kg	LT1LS_2			5.43		10.72	5.43	6.18	2.98	48.3	5
	mg/kg	LT1LS10			6.43		12.33	6.43	7.18	3.35	46.6	5
Hg	mg/kg	LT1F1					0.0000	0.0000	0.0000	0.0000	88.2	3
	mg/kg	LT1F2					0.0000	0.0000	0.0000	0.0000	58.9	3
	mg/kg	LT1F3					0.0001	0.0001	0.0001	0.0000	35.5	3
	mg/kg	LT1F4					0.0001	0.0001	0.0002	0.0002	103.5	4
	mg/kg	LT1F5					0.0002	0.0002	0.0001	0.0001	81.2	3
	mg/kg	LT1F6					0.0006	0.0002	0.0003	0.0003	106.6	3
	mg/kg	LT1F7					0.0010	0.0003	0.0004	0.0005	115.7	3
	mg/kg	LT1LS_2					0.0004	0.0004	0.0020	0.0030	147.1	3
	mg/kg	LT1LS10					0.002	0.002	0.003	0.003	104.6	3
Mo	mg/kg	LT1F1			0.92		0.94	0.92	0.86	0.45	52.5	7
	mg/kg	LT1F2			0.27		0.33	0.27	0.33	0.21	64.9	6
	mg/kg	LT1F3			0.20		0.16	0.20	0.18	0.05	26.3	5
	mg/kg	LT1F4			0.05		0.05	0.05	0.06	0.04	63.0	5
	mg/kg	LT1F5			0.01		0.01	0.01	0.01	0.01	59.0	4
	mg/kg	LT1F6			0.003		0.030	0.003	0.003	0.002	81.7	4
	mg/kg	LT1F7					0.050	0.013	0.019	0.022	118.3	4
	mg/kg	LT1LS_2		-0.89	1.91	50	1.49	1.91	1.77	0.76	42.9	7
	mg/kg	LT1LS10		-0.87	2.00	50	1.57	2.00	1.81	0.79	43.5	7
Ni	mg/kg	LT1F1					0.001	0.001	0.001	0.001	57.5	3
	mg/kg	LT1F2					0.0009	0.0009	0.0012	0.0007	54.5	3
	mg/kg	LT1F3					0.000	0.004	0.004	0.003	82.1	3
	mg/kg	LT1F4					0.0005	0.0003	0.0003	0.0003	117.4	2
	mg/kg	LT1F5					0.0010	0.0005	0.0005	0.0006	117.8	2
	mg/kg	LT1F6					0.0030	0.0015	0.0015	0.0021	132.9	2
	mg/kg	LT1F7					0.005	0.003	0.003	0.003	121.9	2
	mg/kg	LT1LS_2					0.004	0.007	0.007	0.004	63.7	2

Participant 5												
Measurand	Unit	Sample	-3 0 3	z score	Assigned value	$2\times s_{pt}$ %	Participant's result	Md	Mean	sd	sd %	n (stat)
Ni, cont'd	mg/kg	LT1LS10					0.01	0.01	0.01	0.00	8.2	2
Pb	mg/kg	LT1F1			0.045		0.05	0.05	0.05	0.02	34.7	4
	mg/kg	LT1F2			0.031		0.038	0.031	0.031	0.019	59.4	4
	mg/kg	LT1F3			0.035		0.035	0.035	0.033	0.020	61.9	5
	mg/kg	LT1F4			0.005		0.004	0.005	0.005	0.003	66.3	4
	mg/kg	LT1F5					0.001	0.001	0.001	0.001	70.4	3
	mg/kg	LT1F6					0.003	0.002	0.002	0.001	86.4	3
	mg/kg	LT1F7					0.005	0.003	0.003	0.003	129.2	2
	mg/kg	LT1LS_2		-0.05	0.13	50	0.13	0.13	0.11	0.04	33.7	5
	mg/kg	LT1LS10		-0.10	0.14	50	0.14	0.14	0.11	0.04	33.8	5
pH		LT1F1		-0.89	13.8	3,6	13.6	13.8	13.8	0.3	2.2	7
		LT1F2		-1.37	13.8	3,6	13.5	13.8	13.7	0.3	2.1	7
		LT1F3		-1.07	13.6	3,7	13.3	13.6	13.5	0.3	2.0	8
		LT1F4		-1.00	13.1	3,8	12.9	13.1	13.2	0.4	2.7	8
		LT1F5		-0.80	12.8	3,9	12.6	13.0	12.8	0.3	2.7	8
		LT1F6		-0.08	12.1	4,1	12.1	12.1	12.1	0.3	2.6	8
		LT1F7		0.60	11.6	4,3	11.8	11.8	11.6	0.5	4.2	8
Sb	mg/kg	LT1F1			0.001		0.001	0.001	0.001	0.000	3.2	3
	mg/kg	LT1F2			0.001		0.001	0.001	0.001	0.001	38.0	4
	mg/kg	LT1F3			0.004		0.003	0.003	0.003	0.001	16.6	4
	mg/kg	LT1F4			0.003		0.005	0.003	0.003	0.002	64.8	4
	mg/kg	LT1F5					0.010	0.004	0.004	0.005	101.8	4
	mg/kg	LT1F6					0.030	0.007	0.012	0.016	125.5	3
	mg/kg	LT1F7					0.050	0.008	0.019	0.027	137.7	3
	mg/kg	LT1LS_2			0.016		0.020	0.016	0.023	0.019	84.0	4
	mg/kg	LT1LS10			0.052		0.101	0.052	0.055	0.044	80.4	3
Se	mg/kg	LT1F1			0.16		0.16	0.16	0.17	0.06	34.9	5
	mg/kg	LT1F2			0.049		0.056	0.049	0.056	0.037	65.9	4
	mg/kg	LT1F3			0.047		0.043	0.047	0.049	0.018	37.3	6
	mg/kg	LT1F4			0.016		0.014	0.016	0.014	0.010	68.2	4
	mg/kg	LT1F5					0.01	0.01	0.03	0.04	139.8	3
	mg/kg	LT1F6					0.03	0.01	0.01	0.02	145.7	2
	mg/kg	LT1F7					0.05	0.03	0.03	0.03	135.3	2
	mg/kg	LT1LS_2		0.46	0.25	50	0.28	0.25	0.27	0.09	34.7	6
	mg/kg	LT1LS10		0.96	0.29	50	0.36	0.29	0.28	0.10	35.4	6
SO_4	mg/kg	LT1F1			1869		1458	1869	1960	925	47.2	6
	mg/kg	LT1F2			2700		2612	2700	2941	971	33.0	6
	mg/kg	LT1F3			17200		14680	17200	16348	1448	8.9	5
	mg/kg	LT1F4			5559		6682	5559	5103	2688	52.7	6
	mg/kg	LT1F5			33.3		116.9	33.3	49.4	45.9	93.1	4
	mg/kg	LT1F6			11.1		12.2	11.1	11.2	5.1	45.5	4
	mg/kg	LT1F7			5.55		5.55	5.55	5.24	1.24	23.7	3
	mg/kg	LT1LS_2		-0.45	26755	20	25550	27680	26755	1512	5.7	5
	mg/kg	LT1LS10		-0.57	27123	20	25570	27700	27123	1059	3.9	5
V	mg/kg	LT1F1			8.66		8.37	8.66	7.78	3.73	48.0	6
	mg/kg	LT1F2			3.62		4.60	3.62	4.04	2.35	58.3	5
	mg/kg	LT1F3			5.59		5.18	5.59	5.23	1.62	31.0	6
	mg/kg	LT1F4			1.62		1.85	1.62	2.20	1.93	87.8	6

Participant 5												
Measurand	Unit	Sample	-3 0 3	z score	Assigned value	2×s_{pt} %	Participant's result	Md	Mean	sd	sd %	n (stat)
V, cont'd	mg/kg	LT1F5			0.16		0.18	0.16	0.14	0.05	37.3	4
	mg/kg	LT1F6			0.087		0.073	0.087	0.078	0.036	46.4	5
	mg/kg	LT1F7			0.029		0.050	0.029	0.035	0.012	34.7	5
	mg/kg	LT1LS_2		0.18	19.3	50	20.2	19.3	19.4	6.0	31.1	6
	mg/kg	LT1LS10		-0.02	20.4	50	20.3	20.4	19.9	6.1	30.5	6
Zn	mg/kg	LT1F1			38.6		38.6	38.6	33.5	17.4	51.9	7
	mg/kg	LT1F2			25.2		29.1	25.2	23.7	15.5	65.2	6
	mg/kg	LT1F3			24.7		29.9	24.7	21.9	13.5	61.8	7
	mg/kg	LT1F4			4.89		6.20	4.89	6.39	7.15	111.9	7
	mg/kg	LT1F5			0.22		0.41	0.22	0.27	0.15	53.8	5
	mg/kg	LT1F6			0.036		0.143	0.036	0.039	0.016	40.5	4
	mg/kg	LT1F7					0.06	0.08	0.22	0.27	119.2	3
	mg/kg	LT1LS_2		0.49	92.7	50	104.1	92.7	82.7	36.9	44.6	7
	mg/kg	LT1LS10		0.50	92.7	50	104.3	92.7	83.1	36.6	44.0	7

Participant 6												
Measurand	Unit	Sample	-3 0 3	z score	Assigned value	2×s_{pt} %	Participant's result	Md	Mean	sd	sd %	n (stat)
As	mg/kg	LT1F1			0.31		0.15	0.26	0.31	0.14	45.7	5
	mg/kg	LT1F2			0.066		0.029	0.066	0.096	0.074	76.7	5
	mg/kg	LT1F3			0.11		0.04	0.11	0.10	0.05	46.9	6
	mg/kg	LT1F4			0.013		0.002	0.013	0.017	0.016	96.3	4
	mg/kg	LT1F5					0.000	0.005	0.005	0.005	98.5	3
	mg/kg	LT1F6					0.00	0.02	0.02	0.02	141.3	2
	mg/kg	LT1F7					0.00	0.02	0.02	0.04	141.7	2
	mg/kg	LT1LS_2		-2.11	0.46	50	0.22	0.46	0.49	0.20	40.4	6
	mg/kg	LT1LS10		-2.27	0.50	50	0.22	0.50	0.50	0.20	39.4	6
Ba	mg/kg	LT1F1			0.15		0.25	0.15	0.16	0.08	49.0	6
	mg/kg	LT1F2			0.11		0.07	0.11	0.12	0.08	68.0	6
	mg/kg	LT1F3			0.21		0.14	0.21	0.25	0.10	42.4	7
	mg/kg	LT1F4			0.14		0.15	0.14	0.14	0.06	44.8	6
	mg/kg	LT1F5			0.18		0.30	0.18	0.19	0.15	76.2	6
	mg/kg	LT1F6			0.75		1.80	0.75	0.92	0.46	49.7	7
	mg/kg	LT1F7			3.01		3.30	3.01	2.54	1.02	40.1	8
	mg/kg	LT1LS_2		-0.06	0.92	50	0.91	0.92	0.86	0.22	26.1	6
	mg/kg	LT1LS10		0.69	5.12	50	6.01	5.12	4.75	1.23	25.9	6
Cd	mg/kg	LT1F1			0.0008		0.0003	0.0008	0.0008	0.0005	59.2	4
	mg/kg	LT1F2			0.0009		0.0002	0.0009	0.0008	0.0005	58.8	4
	mg/kg	LT1F3			0.0006		0.0006	0.0006	0.0009	0.0006	60.3	3
	mg/kg	LT1F4					0.000	0.002	0.003	0.004	126.8	3
	mg/kg	LT1F5					0.000	0.000	0.003	0.004	163.6	3
	mg/kg	LT1F6					0.0000	0.0009	0.0029	0.0043	147.0	3
	mg/kg	LT1F7					0.000	0.002	0.003	0.004	124.6	3
	mg/kg	LT1LS_2			0.004		*<0,030*	0.003	0.004	0.002	51.1	3
	mg/kg	LT1LS10					*<0,0040*	0.005	0.005	0.004	78.8	2
Cl	mg/kg	LT1F1			1233		870	1233	1078	530	49.2	6
	mg/kg	LT1F2			617		82	617	469	307	65.5	5
	mg/kg	LT1F3			217		69	217	271	163	59.9	6
	mg/kg	LT1F4			19.6		4.6	19.6	21.9	14.1	64.4	5

Participant 6												
Measurand	Unit	Sample	-3 0 3	z score	Assigned value	2×s_{pt} %	Participant's result	Md	Mean	sd	sd %	n (stat)
Cl, cont'd	mg/kg	LT1F5			4.80		1.70	4.80	4.49	2.10	46.8	4
	mg/kg	LT1F6			2.77		1.77	2.77	3.64	2.46	67.6	4
	mg/kg	LT1F7			2.35		2.55	2.35	2.29	0.45	19.8	4
	mg/kg	LT1LS_2		-2.02	2079	50	1027	2079	1957	615	31.4	6
	mg/kg	LT1LS10		-2.05	2116	50	1032	2116	1974	616	31.2	6
Conductivity 25	mS/m	LT1F1			35100		29000	35100	31336	7820	25.0	5
	mS/m	LT1F2			34000		22000	34000	38207	19053	49.9	7
	mS/m	LT1F3			24000		14000	24000	23066	5665	24.6	7
	mS/m	LT1F4			13190		2900	13190	12617	4896	38.8	8
	mS/m	LT1F5			2245		680	2245	2122	771	36.4	6
	mS/m	LT1F6			415		180	415	388	106	27.4	6
	mS/m	LT1F7			204		240	204	206	24	11.5	6
Cr	mg/kg	LT1F1			2.90		1.80	2.90	2.46	1.11	45.1	7
	mg/kg	LT1F2			1.13		0.46	1.13	1.19	0.69	58.0	6
	mg/kg	LT1F3			1.70		0.69	1.70	1.65	0.49	29.9	7
	mg/kg	LT1F4			0.70		0.06	0.70	0.91	0.70	76.4	7
	mg/kg	LT1F5			0.038		0.010	0.038	0.048	0.033	68.0	5
	mg/kg	LT1F6			0.017		0.006	0.017	0.015	0.008	56.3	5
	mg/kg	LT1F7			0.013		0.023	0.013	0.014	0.008	52.5	3
	mg/kg	LT1LS_2		-2.11	6.38	50	3.02	6.38	6.41	2.02	31.5	7
	mg/kg	LT1LS10		-2.19	6.73	50	3.04	6.73	6.51	2.04	31.4	7
Cu	mg/kg	LT1F1			0.016		0.016	0.016	0.016	0.012	73.3	5
	mg/kg	LT1F2					0.002	0.004	0.007	0.010	132.5	4
	mg/kg	LT1F3			0.018		0.008	0.018	0.014	0.009	62.2	5
	mg/kg	LT1F4			0.005		0.001	0.005	0.005	0.004	75.4	4
	mg/kg	LT1F5					0.000	0.005	0.004	0.003	75.3	3
	mg/kg	LT1F6					0.000	0.003	0.008	0.011	141.8	3
	mg/kg	LT1F7					0.00	0.03	0.04	0.04	111.2	3
	mg/kg	LT1LS_2			0.044		0.027	0.044	0.047	0.028	58.8	5
	mg/kg	LT1LS10		-1.88	0.054	50	0.029	0.054	0.058	0.021	35.7	5
DOC	mg/kg	LT1F1			13.8		220.0	13.8	14.6	3.3	22.4	4
	mg/kg	LT1F2			6.87		22.00	6.87	10.69	8.00	74.8	5
	mg/kg	LT1F3			7.73		54.00	7.73	9.99	7.01	70.2	5
	mg/kg	LT1F4			5.59		7.50	5.59	5.10	2.12	41.5	5
	mg/kg	LT1F5			4.03		4.20	4.03	3.57	1.75	49.1	4
	mg/kg	LT1F6			3.59		9.00	3.59	4.37	3.37	77.2	4
	mg/kg	LT1F7			5.83		22.50	4.29	8.12	9.76	120.3	4
	mg/kg	LT1LS_2			40.1		307.7	40.1	45.2	23.7	52.4	4
	mg/kg	LT1LS10			54.7		339.2	54.7	58.9	22.8	38.7	3
F	mg/kg	LT1F1			1.18		1.30	1.18	1.17	0.11	9.4	5
	mg/kg	LT1F2			0.88		0.15	0.88	0.78	0.46	59.3	4
	mg/kg	LT1F3			1.76		0.54	1.76	1.84	0.92	49.9	5
	mg/kg	LT1F4			1.19		0.30	1.19	1.08	0.56	51.8	4
	mg/kg	LT1F5			0.48		0.24	0.48	0.50	0.18	35.3	5
	mg/kg	LT1F6			0.49		0.28	0.49	0.50	0.21	43.0	4
	mg/kg	LT1F7					0.315	0.32	0.52	0.42	79.7	3
	mg/kg	LT1LS_2			5.43		2.53	5.43	6.18	2.98	48.3	5
	mg/kg	LT1LS10			6.43		3.12	6.43	7.18	3.35	46.6	5

Participant 6												
Measurand	Unit	Sample	-3 0 3	z score	Assigned value	2×s_{pt} %	Participant's result	Md	Mean	sd	sd %	n (stat)
Hg	mg/kg	LT1F1					0.0001	0.0000	0.0000	0.0000	88.2	3
	mg/kg	LT1F2					0.0000	0.0000	0.0000	0.0000	58.9	3
	mg/kg	LT1F3					0.0001	0.0001	0.0001	0.0000	35.5	3
	mg/kg	LT1F4					0.0000	0.0001	0.0002	0.0002	103.5	4
	mg/kg	LT1F5					0.0000	0.0002	0.0001	0.0001	81.2	3
	mg/kg	LT1F6					0.0000	0.0002	0.0003	0.0003	106.6	3
	mg/kg	LT1F7					0.0000	0.0003	0.0004	0.0005	115.7	3
	mg/kg	LT1LS_2					0.0002	0.0004	0.0020	0.0030	147.1	3
	mg/kg	LT1LS10					0.000	0.002	0.003	0.003	104.6	3
Mo	mg/kg	LT1F1			0.92		0.58	0.92	0.86	0.45	52.5	7
	mg/kg	LT1F2			0.27		0.09	0.27	0.33	0.21	64.9	6
	mg/kg	LT1F3			0.20		0.11	0.20	0.18	0.05	26.3	5
	mg/kg	LT1F4			0.05		0.01	0.05	0.06	0.04	63.0	5
	mg/kg	LT1F5			0.01		0.00	0.01	0.01	0.01	59.0	4
	mg/kg	LT1F6			0.003		0.001	0.003	0.003	0.002	81.7	4
	mg/kg	LT1F7					0.005	0.013	0.019	0.022	118.3	4
	mg/kg	LT1LS_2		-2.35	1.91	50	0.79	1.91	1.77	0.76	42.9	7
	mg/kg	LT1LS10		-2.41	2.00	50	0.80	2.00	1.81	0.79	43.5	7
Ni	mg/kg	LT1F1					0.002	0.001	0.001	0.001	57.5	3
	mg/kg	LT1F2					0.0020	0.0009	0.0012	0.0007	54.5	3
	mg/kg	LT1F3					0.006	0.004	0.004	0.003	82.1	3
	mg/kg	LT1F4					0.0000	0.0003	0.0003	0.0003	117.4	2
	mg/kg	LT1F5					0.0001	0.0005	0.0005	0.0006	117.8	2
	mg/kg	LT1F6					0.0001	0.0015	0.0015	0.0021	132.9	2
	mg/kg	LT1F7					0.000	0.003	0.003	0.003	121.9	2
	mg/kg	LT1LS_2					0.010	0.007	0.007	0.004	63.7	2
	mg/kg	LT1LS10					0.01	0.01	0.01	0.00	8.2	2
Pb	mg/kg	LT1F1			0.045		0.03	0.05	0.05	0.02	34.7	4
	mg/kg	LT1F2			0.031		0.010	0.031	0.031	0.019	59.4	4
	mg/kg	LT1F3			0.035		0.012	0.035	0.033	0.020	61.9	5
	mg/kg	LT1F4			0.005		0.001	0.005	0.005	0.003	66.3	4
	mg/kg	LT1F5					0.000	0.001	0.001	0.001	70.4	3
	mg/kg	LT1F6					0.000	0.002	0.002	0.001	86.4	3
	mg/kg	LT1F7					0.000	0.003	0.003	0.003	129.2	2
	mg/kg	LT1LS_2		-2.45	0.13	50	0.05	0.13	0.11	0.04	33.7	5
	mg/kg	LT1LS10		-2.55	0.14	50	0.05	0.14	0.11	0.04	33.8	5
pH		LT1F1		-1.21	13.8	3,6	13.5	13.8	13.8	0.3	2.2	7
		LT1F2		-2.01	13.8	3,6	13.3	13.8	13.7	0.3	2.1	7
		LT1F3		-1.99	13.6	3,7	13.1	13.6	13.5	0.3	2.0	8
		LT1F4		-1.61	13.1	3,8	12.7	13.1	13.2	0.4	2.7	8
		LT1F5		-2.00	12.8	3,9	12.3	13.0	12.8	0.3	2.7	8
		LT1F6		-1.21	12.1	4,1	11.8	12.1	12.1	0.3	2.6	8
		LT1F7		0.80	11.6	4,3	11.8	11.8	11.6	0.5	4.2	8
Sb	mg/kg	LT1F1			0.001		0.010	0.001	0.001	0.000	3.2	3
	mg/kg	LT1F2			0.001		0.010	0.001	0.001	0.001	38.0	4
	mg/kg	LT1F3			0.004		0.030	0.003	0.003	0.001	16.6	4
	mg/kg	LT1F4			0.003		0.001	0.003	0.003	0.002	64.8	4
	mg/kg	LT1F5					0.000	0.004	0.004	0.005	101.8	4

Participant 6												
Measurand	Unit	Sample	-3 0 3	z score	Assigned value	2×s_{pt} %	Participant's result	Md	Mean	sd	sd %	n (stat)
Sb, cont'd	mg/kg	LT1F6					0.000	0.007	0.012	0.016	125.5	3
	mg/kg	LT1F7					0.001	0.008	0.019	0.027	137.7	3
	mg/kg	LT1LS_2			0.016		0.051	0.016	0.023	0.019	84.0	4
	mg/kg	LT1LS10			0.052		0.052	0.052	0.055	0.044	80.4	3
Se	mg/kg	LT1F1			0.16		0.11	0.16	0.17	0.06	34.9	5
	mg/kg	LT1F2			0.049		0.020	0.049	0.056	0.037	65.9	4
	mg/kg	LT1F3			0.047		0.023	0.047	0.049	0.018	37.3	6
	mg/kg	LT1F4			0.016		0.001	0.016	0.014	0.010	68.2	4
	mg/kg	LT1F5					0.00	0.01	0.03	0.04	139.8	3
	mg/kg	LT1F6					0.00	0.01	0.01	0.02	145.7	2
	mg/kg	LT1F7					0.00	0.03	0.03	0.03	135.3	2
	mg/kg	LT1LS_2		-1.53	0.25	50	0.15	0.25	0.27	0.09	34.7	6
	mg/kg	LT1LS10		-1.87	0.29	50	0.15	0.29	0.28	0.10	35.4	6
SO_4	mg/kg	LT1F1			1869		3400	1869	1960	925	47.2	6
	mg/kg	LT1F2			2700		4100	2700	2941	971	33.0	6
	mg/kg	LT1F3			17200		6900	17200	16348	1448	8.9	5
	mg/kg	LT1F4			5559		375	5559	5103	2688	52.7	6
	mg/kg	LT1F5			33.3		14.0	33.3	49.4	45.9	93.1	4
	mg/kg	LT1F6			11.1		5.1	11.1	11.2	5.1	45.5	4
	mg/kg	LT1F7			5.55		30.50	5.55	5.24	1.24	23.7	3
	mg/kg	LT1LS_2		-4.47	26755	20	14789	27680	26755	1512	5.7	5
	mg/kg	LT1LS10		-4.53	27123	20	14825	27700	27123	1059	3.9	5
V	mg/kg	LT1F1			8.66		5.70	8.66	7.78	3.73	48.0	6
	mg/kg	LT1F2			3.62		2.60	3.62	4.04	2.35	58.3	5
	mg/kg	LT1F3			5.59		2.22	5.59	5.23	1.62	31.0	6
	mg/kg	LT1F4			1.62		0.21	1.62	2.20	1.93	87.8	6
	mg/kg	LT1F5			0.16		0.06	0.16	0.14	0.05	37.3	4
	mg/kg	LT1F6			0.087		0.021	0.087	0.078	0.036	46.4	5
	mg/kg	LT1F7			0.029		0.047	0.029	0.035	0.012	34.7	5
	mg/kg	LT1LS_2		-1.76	19.3	50	10.8	19.3	19.4	6.0	31.1	6
	mg/kg	LT1LS10		-1.87	20.4	50	10.9	20.4	19.9	6.1	30.5	6
Zn	mg/kg	LT1F1			38.6		18.0	38.6	33.5	17.4	51.9	7
	mg/kg	LT1F2			25.2		6.2	25.2	23.7	15.5	65.2	6
	mg/kg	LT1F3			24.7		6.6	24.7	21.9	13.5	61.8	7
	mg/kg	LT1F4			4.89		0.55	4.89	6.39	7.15	111.9	7
	mg/kg	LT1F5			0.22		0.09	0.22	0.27	0.15	53.8	5
	mg/kg	LT1F6			0.036		0.060	0.036	0.039	0.016	40.5	4
	mg/kg	LT1F7					0.08	0.08	0.22	0.27	119.2	3
	mg/kg	LT1LS_2		-2.64	92.7	50	31.4	92.7	82.7	36.9	44.6	7
	mg/kg	LT1LS10		-2.64	92.7	50	31.6	92.7	83.1	36.6	44.0	7

Participant 8												
Measurand	Unit	Sample	-3 0 3	z score	Assigned value	2×s_{pt} %	Participant's result	Md	Mean	sd	sd %	n (stat)
As	mg/kg	LT1F1			0.31		0.36	0.26	0.31	0.14	45.7	5
	mg/kg	LT1F2			0.066		0.212	0.066	0.096	0.074	76.7	5
	mg/kg	LT1F3			0.11		0.10	0.11	0.10	0.05	46.9	6
	mg/kg	LT1F4			0.013		0.039	0.013	0.017	0.016	96.3	4
	mg/kg	LT1F5					0.005	0.005	0.005	0.005	98.5	3
	mg/kg	LT1F6					*<0,000211*	0.02	0.02	0.02	141.3	2
	mg/kg	LT1F7					*<0,000183*	0.02	0.02	0.04	141.7	2
	mg/kg	LT1LS_2		2.19	0.46	50	0.71	0.46	0.49	0.20	40.4	6
	mg/kg	LT1LS10		1.70	0.50	50	0.71	0.50	0.50	0.20	39.4	6
Ba	mg/kg	LT1F1			0.15		0.24	0.15	0.16	0.08	49.0	6
	mg/kg	LT1F2			0.11		0.24	0.11	0.12	0.08	68.0	6
	mg/kg	LT1F3			0.21		0.29	0.21	0.25	0.10	42.4	7
	mg/kg	LT1F4			0.14		0.13	0.14	0.14	0.06	44.8	6
	mg/kg	LT1F5			0.18		0.06	0.18	0.19	0.15	76.2	6
	mg/kg	LT1F6			0.75		0.65	0.75	0.92	0.46	49.7	7
	mg/kg	LT1F7			3.01		3.38	3.01	2.54	1.02	40.1	8
	mg/kg	LT1LS_2		0.16	0.92	50	0.96	0.92	0.86	0.22	26.1	6
	mg/kg	LT1LS10		-0.10	5.12	50	5.00	5.12	4.75	1.23	25.9	6
Cd	mg/kg	LT1F1			0.0008		0.0011	0.0008	0.0008	0.0005	59.2	4
	mg/kg	LT1F2			0.0009		0.0008	0.0009	0.0008	0.0005	58.8	4
	mg/kg	LT1F3			0.0006		*<0,000221*	0.0006	0.0009	0.0006	60.3	3
	mg/kg	LT1F4					*<0,0000271*	0.002	0.003	0.004	126.8	3
	mg/kg	LT1F5					*<0,0000238*	0.000	0.003	0.004	163.6	3
	mg/kg	LT1F6					*<0,000012*	0.0009	0.0029	0.0043	147.0	3
	mg/kg	LT1F7					*<0,0000091*	0.002	0.003	0.004	124.6	3
	mg/kg	LT1LS_2			0.004		0.002	0.003	0.004	0.002	51.1	3
	mg/kg	LT1LS10					0.002	0.005	0.005	0.004	78.8	2
Cl	mg/kg	LT1F1			1233		1398	1233	1078	530	49.2	6
	mg/kg	LT1F2			617		700	617	469	307	65.5	5
	mg/kg	LT1F3			217		372	217	271	163	59.9	6
	mg/kg	LT1F4			19.6		40.5	19.6	21.9	14.1	64.4	5
	mg/kg	LT1F5			4.80		6.67	4.80	4.49	2.10	46.8	4
	mg/kg	LT1F6			2.77		2.58	2.77	3.64	2.46	67.6	4
	mg/kg	LT1F7			2.35		*<2,5*	2.35	2.29	0.45	19.8	4
	mg/kg	LT1LS_2		0.84	2079	50	2517	2079	1957	615	31.4	6
	mg/kg	LT1LS10		0.77	2116	50	2521,681	2116	1974	616	31.2	6
Conductivity 25	mS/m	LT1F1			35100		36000	35100	31336	7820	25.0	5
	mS/m	LT1F2			34000		34000	34000	38207	19053	49.9	7
	mS/m	LT1F3			24000		24000	24000	23066	5665	24.6	7
	mS/m	LT1F4			13190		12000	13190	12617	4896	38.8	8
	mS/m	LT1F5			2245		2500	2245	2122	771	36.4	6
	mS/m	LT1F6			415		430	415	388	106	27.4	6
	mS/m	LT1F7			204		180	204	206	24	11.5	6
Cr	mg/kg	LT1F1			2.90		3.69	2.90	2.46	1.11	45.1	7
	mg/kg	LT1F2			1.13		2.27	1.13	1.19	0.69	58.0	6
	mg/kg	LT1F3			1.70		1.82	1.70	1.65	0.49	29.9	7
	mg/kg	LT1F4			0.70		1.03	0.70	0.91	0.70	76.4	7
	mg/kg	LT1F5			0.038		0.098	0.038	0.048	0.033	68.0	5

Participant 8												
Measurand	Unit	Sample	-3 0 3	z score	Assigned value	2×s_{pt} %	Participant's result	Md	Mean	sd	sd %	n (stat)
Cr, cont'd	mg/kg	LT1F6			0.017		0.017	0.017	0.015	0.008	56.3	5
	mg/kg	LT1F7			0.013		*<0,00856*	0.013	0.014	0.008	52.5	3
	mg/kg	LT1LS_2		1.59	6.38	50	8.92	6.38	6.41	2.02	31.5	7
	mg/kg	LT1LS10		1.31	6.73	50	8.94	6.73	6.51	2.04	31.4	7
Cu	mg/kg	LT1F1			0.016		0.027	0.016	0.016	0.012	73.3	5
	mg/kg	LT1F2					0.022	0.004	0.007	0.010	132.5	4
	mg/kg	LT1F3			0.018		0.018	0.018	0.014	0.009	62.2	5
	mg/kg	LT1F4			0.005		0.008	0.005	0.005	0.004	75.4	4
	mg/kg	LT1F5					*<0,00265*	0.005	0.004	0.003	75.3	3
	mg/kg	LT1F6					*<0,00258*	0.003	0.008	0.011	141.8	3
	mg/kg	LT1F7					*<0,000680*	0.03	0.04	0.04	111.2	3
	mg/kg	LT1LS_2			0.044		0.077	0.044	0.047	0.028	58.8	5
	mg/kg	LT1LS10		1.98	0.054	50	0.081	0.054	0.058	0.021	35.7	5
DOC	mg/kg	LT1F1			13.8		19.1	13.8	14.6	3.3	22.4	4
	mg/kg	LT1F2			6.87		6.87	6.87	10.69	8.00	74.8	5
	mg/kg	LT1F3			7.73		7.57	7.73	9.99	7.01	70.2	5
	mg/kg	LT1F4			5.59		5.59	5.59	5.10	2.12	41.5	5
	mg/kg	LT1F5			4.03		5.17	4.03	3.57	1.75	49.1	4
	mg/kg	LT1F6			3.59		4.61	3.59	4.37	3.37	77.2	4
	mg/kg	LT1F7			5.83		5.83	4.29	8.12	9.76	120.3	4
	mg/kg	LT1LS_2			40.1		44.3	40.1	45.2	23.7	52.4	4
	mg/kg	LT1LS10			54.7		54.7	54.7	58.9	22.8	38.7	3
F	mg/kg	LT1F1			1.18		1.22	1.18	1.17	0.11	9.4	5
	mg/kg	LT1F2			0.88		0.76	0.88	0.78	0.46	59.3	4
	mg/kg	LT1F3			1.76		1.57	1.76	1.84	0.92	49.9	5
	mg/kg	LT1F4			1.19		1.20	1.19	1.08	0.56	51.8	4
	mg/kg	LT1F5			0.48		0.64	0.48	0.50	0.18	35.3	5
	mg/kg	LT1F6			0.49		0.37	0.49	0.50	0.21	43.0	4
	mg/kg	LT1F7					*<0,498*	0.32	0.52	0.42	79.7	3
	mg/kg	LT1LS_2			5.43		5.38	5.43	6.18	2.98	48.3	5
	mg/kg	LT1LS10			6.43		6,247	6.43	7.18	3.35	46.6	5
Mo	mg/kg	LT1F1			0.92		1.14	0.92	0.86	0.45	52.5	7
	mg/kg	LT1F2			0.27		0.60	0.27	0.33	0.21	64.9	6
	mg/kg	LT1F3			0.20		0.23	0.20	0.18	0.05	26.3	5
	mg/kg	LT1F4			0.05		0.11	0.05	0.06	0.04	63.0	5
	mg/kg	LT1F5			0.01		0.02	0.01	0.01	0.01	59.0	4
	mg/kg	LT1F6			0.003		0.005	0.003	0.003	0.002	81.7	4
	mg/kg	LT1F7					*<0,002660*	0.013	0.019	0.022	118.3	4
	mg/kg	LT1LS_2		0.39	1.91	50	2.09	1.91	1.77	0.76	42.9	7
	mg/kg	LT1LS10		0.20	2.00	50	2.10	2.00	1.81	0.79	43.5	7
Ni	mg/kg	LT1F1					*<0,000554*	0.001	0.001	0.001	57.5	3
	mg/kg	LT1F2					*<0,000138*	0.0009	0.0012	0.0007	54.5	3
	mg/kg	LT1F3					*<0,000686*	0.004	0.004	0.003	82.1	3
	mg/kg	LT1F4					*<0,000055*	0.0003	0.0003	0.0003	117.4	2
	mg/kg	LT1F5					*<0,00073*	0.0005	0.0005	0.0006	117.8	2
	mg/kg	LT1F6					*<0,00335*	0.0015	0.0015	0.0021	132.9	2
	mg/kg	LT1F7					*<0,00120*	0.003	0.003	0.003	121.9	2
	mg/kg	LT1LS_2					*<0,00216*	0.007	0.007	0.004	63.7	2

Participant 8												
Measurand	Unit	Sample	-3 0 3	z score	Assigned value	2×s_{pt} %	Participant's result	Md	Mean	sd	sd %	n (stat)
Ni, cont'd	mg/kg	LT1LS10					*<0,00672*	0.01	0.01	0.00	8.2	2
Pb	mg/kg	LT1F1			0.045		0.06	0.05	0.05	0.02	34.7	4
	mg/kg	LT1F2			0.031		0.053	0.031	0.031	0.019	59.4	4
	mg/kg	LT1F3			0.035		0.016	0.035	0.033	0.020	61.9	5
	mg/kg	LT1F4			0.005		0.005	0.005	0.005	0.003	66.3	4
	mg/kg	LT1F5					*<0,001326*	0.001	0.001	0.001	70.4	3
	mg/kg	LT1F6					*<0,000520*	0.002	0.002	0.001	86.4	3
	mg/kg	LT1F7					*<0,000299*	0.003	0.003	0.003	129.2	2
	mg/kg	LT1LS_2		0.32	0.13	50	0.14	0.13	0.11	0.04	33.7	5
	mg/kg	LT1LS10		0.03	0.14	50	0.14	0.14	0.11	0.04	33.8	5
pH		LT1F1		0.81	13.8	3,6	14.0	13.8	13.8	0.3	2.2	7
		LT1F2		0.81	13.8	3,6	14.0	13.8	13.7	0.3	2.1	7
		LT1F3		0.79	13.6	3,7	13.8	13.6	13.5	0.3	2.0	8
		LT1F4		2.41	13.1	3,8	13.7	13.1	13.2	0.4	2.7	8
		LT1F5		1.60	12.8	3,9	13.2	13.0	12.8	0.3	2.7	8
		LT1F6		1.21	12.1	4,1	12.4	12.1	12.1	0.3	2.6	8
		LT1F7		1.60	11.6	4,3	12.0	11.8	11.6	0.5	4.2	8
Sb	mg/kg	LT1F1			0.001		0.002	0.001	0.001	0.000	3.2	3
	mg/kg	LT1F2			0.001		0.002	0.001	0.001	0.001	38.0	4
	mg/kg	LT1F3			0.004		0.004	0.003	0.003	0.001	16.6	4
	mg/kg	LT1F4			0.003		0.003	0.003	0.003	0.002	64.8	4
	mg/kg	LT1F5					0.001	0.004	0.004	0.005	101.8	4
	mg/kg	LT1F6					*<0,000321*	0.007	0.012	0.016	125.5	3
	mg/kg	LT1F7					*<0,000204*	0.008	0.019	0.027	137.7	3
	mg/kg	LT1LS_2			0.016		0.012	0.016	0.023	0.019	84.0	4
	mg/kg	LT1LS10			0.052		0.012	0.052	0.055	0.044	80.4	3
Se	mg/kg	LT1F1			0.16		0.20	0.16	0.17	0.06	34.9	5
	mg/kg	LT1F2			0.049		0.107	0.049	0.056	0.037	65.9	4
	mg/kg	LT1F3			0.047		0.047	0.047	0.049	0.018	37.3	6
	mg/kg	LT1F4			0.016		0.024	0.016	0.014	0.010	68.2	4
	mg/kg	LT1F5					*<0,002388*	0.01	0.03	0.04	139.8	3
	mg/kg	LT1F6					*<0,000749*	0.01	0.01	0.02	145.7	2
	mg/kg	LT1F7					*<0,000454*	0.03	0.03	0.03	135.3	2
	mg/kg	LT1LS_2		2.09	0.25	50	0.38	0.25	0.27	0.09	34.7	6
	mg/kg	LT1LS10		1.26	0.29	50	0.38	0.29	0.28	0.10	35.4	6
SO_4	mg/kg	LT1F1			1869		1908	1869	1960	925	47.2	6
	mg/kg	LT1F2			2700		2787	2700	2941	971	33.0	6
	mg/kg	LT1F3			17200		14882	17200	16348	1448	8.9	5
	mg/kg	LT1F4			5559		4435	5559	5103	2688	52.7	6
	mg/kg	LT1F5			33.3		3992.9	33.3	49.4	45.9	93.1	4
	mg/kg	LT1F6			11.1		17.4	11.1	11.2	5.1	45.5	4
	mg/kg	LT1F7			5.55		6.29	5.55	5.24	1.24	23.7	3
	mg/kg	LT1LS_2		0.47	26755	20	28005	27680	26755	1512	5.7	5
	mg/kg	LT1LS10		0.33	27123	20	28029	27700	27123	1059	3.9	5
V	mg/kg	LT1F1			8.66		11.20	8.66	7.78	3.73	48.0	6
	mg/kg	LT1F2			3.62		7.74	3.62	4.04	2.35	58.3	5
	mg/kg	LT1F3			5.59		6.01	5.59	5.23	1.62	31.0	6
	mg/kg	LT1F4			1.62		2.77	1.62	2.20	1.93	87.8	6

Participant 8												
Measurand	Unit	Sample	-3 0 3	z score	Assigned value	2×s_{pt} %	Participant's result	Md	Mean	sd	sd %	n (stat)
V, cont'd	mg/kg	LT1F5			0.16		0.55	0.16	0.14	0.05	37.3	4
	mg/kg	LT1F6			0.087		0.121	0.087	0.078	0.036	46.4	5
	mg/kg	LT1F7			0.029		0.025	0.029	0.035	0.012	34.7	5
	mg/kg	LT1LS_2		1.86	19.3	50	28.3	19.3	19.4	6.0	31.1	6
	mg/kg	LT1LS10		1.57	20.4	50	28.4	20.4	19.9	6.1	30.5	6
Zn	mg/kg	LT1F1			38.6		47.9	38.6	33.5	17.4	51.9	7
	mg/kg	LT1F2			25.2		41.0	25.2	23.7	15.5	65.2	6
	mg/kg	LT1F3			24.7		3.0	24.7	21.9	13.5	61.8	7
	mg/kg	LT1F4			4.89		0.43	4.89	6.39	7.15	111.9	7
	mg/kg	LT1F5			0.22		0.43	0.22	0.27	0.15	53.8	5
	mg/kg	LT1F6			0.036		0.033	0.036	0.039	0.016	40.5	4
	mg/kg	LT1F7					*<0,00981*	0.08	0.22	0.27	119.2	3
	mg/kg	LT1LS_2		0.00	92.7	50	92.7	92.7	82.7	36.9	44.6	7
	mg/kg	LT1LS10		0.00	92.7	50	92.7	92.7	83.1	36.6	44.0	7

Participant 9												
Measurand	Unit	Sample	-3 0 3	z score	Assigned value	2×s_{pt} %	Participant's result	Md	Mean	sd	sd %	n (stat)
As	mg/kg	LT1F1			0.31		*<0,05*	0.26	0.31	0.14	45.7	5
	mg/kg	LT1F2			0.066		0.050	0.066	0.096	0.074	76.7	5
	mg/kg	LT1F3			0.11		0.16	0.11	0.10	0.05	46.9	6
	mg/kg	LT1F4			0.013		0.160	0.013	0.017	0.016	96.3	4
	mg/kg	LT1F5					0.100	0.005	0.005	0.005	98.5	3
	mg/kg	LT1F6					*<0,05*	0.02	0.02	0.02	141.3	2
	mg/kg	LT1F7					*<0,05*	0.02	0.02	0.04	141.7	2
	mg/kg	LT1LS_2		0.09	0.46	50	0.47	0.46	0.49	0.20	40.4	6
	mg/kg	LT1LS10		-0.24	0.50	50	0.47	0.50	0.50	0.20	39.4	6
Ba	mg/kg	LT1F1			0.15		0.09	0.15	0.16	0.08	49.0	6
	mg/kg	LT1F2			0.11		0.09	0.11	0.12	0.08	68.0	6
	mg/kg	LT1F3			0.21		0.21	0.21	0.25	0.10	42.4	7
	mg/kg	LT1F4			0.14		0.20	0.14	0.14	0.06	44.8	6
	mg/kg	LT1F5			0.18		0.35	0.18	0.19	0.15	76.2	6
	mg/kg	LT1F6			0.75		1.18	0.75	0.92	0.46	49.7	7
	mg/kg	LT1F7			3.01		3.13	3.01	2.54	1.02	40.1	8
	mg/kg	LT1LS_2		0.09	0.92	50	0.94	0.92	0.86	0.22	26.1	6
	mg/kg	LT1LS10		0.10	5.12	50	5.25	5.12	4.75	1.23	25.9	6
Cd	mg/kg	LT1F1			0.0008		*<0,02*	0.0008	0.0008	0.0005	59.2	4
	mg/kg	LT1F2			0.0009		*<0,02*	0.0009	0.0008	0.0005	58.8	4
	mg/kg	LT1F3			0.0006		*<0,02*	0.0006	0.0009	0.0006	60.3	3
	mg/kg	LT1F4					*<0,02*	0.002	0.003	0.004	126.8	3
	mg/kg	LT1F5					*<0,02*	0.000	0.003	0.004	163.6	3
	mg/kg	LT1F6					*<0,02*	0.0009	0.0029	0.0043	147.0	3
	mg/kg	LT1F7					*<0,02*	0.002	0.003	0.004	124.6	3
	mg/kg	LT1LS_2			0.004		*<0,02*	0.003	0.004	0.002	51.1	3
	mg/kg	LT1LS10					*<0,02*	0.005	0.005	0.004	78.8	2
Cl	mg/kg	LT1F1			1233		121	1233	1078	530	49.2	6
	mg/kg	LT1F2			617		197	617	469	307	65.5	5
	mg/kg	LT1F3			217		540	217	271	163	59.9	6
	mg/kg	LT1F4			19.6		692.0	19.6	21.9	14.1	64.4	5

Participant 9												
Measurand	Unit	Sample	-3 0 3	z score	Assigned value	2×s_{pt} %	Participant's result	Md	Mean	sd	sd %	n (stat)
Cl, cont'd	mg/kg	LT1F5			4.80		427.00	4.80	4.49	2.10	46.8	4
	mg/kg	LT1F6			2.77		65.50	2.77	3.64	2.46	67.6	4
	mg/kg	LT1F7			2.35		2.74	2.35	2.29	0.45	19.8	4
	mg/kg	LT1LS_2		-0.20	2079	50	1977	2079	1957	615	31.4	6
	mg/kg	LT1LS10		-0.13	2116	50	2045	2116	1974	616	31.2	6
Conductivity 25	mS/m	LT1F1			35100		18680	35100	31336	7820	25.0	5
	mS/m	LT1F2			34000		19650	34000	38207	19053	49.9	7
	mS/m	LT1F3			24000		19280	24000	23066	5665	24.6	7
	mS/m	LT1F4			13190		14790	13190	12617	4896	38.8	8
	mS/m	LT1F5			2245		7570	2245	2122	771	36.4	6
	mS/m	LT1F6			415		1175	415	388	106	27.4	6
	mS/m	LT1F7			204		212	204	206	24	11.5	6
Cr	mg/kg	LT1F1			2.90		0.48	2.90	2.46	1.11	45.1	7
	mg/kg	LT1F2			1.13		0.57	1.13	1.19	0.69	58.0	6
	mg/kg	LT1F3			1.70		1.78	1.70	1.65	0.49	29.9	7
	mg/kg	LT1F4			0.70		1.95	0.70	0.91	0.70	76.4	7
	mg/kg	LT1F5			0.038		1.570	0.038	0.048	0.033	68.0	5
	mg/kg	LT1F6			0.017		0.410	0.017	0.015	0.008	56.3	5
	mg/kg	LT1F7			0.013		*<0,05*	0.013	0.014	0.008	52.5	3
	mg/kg	LT1LS_2		-0.02	6.38	50	6.35	6.38	6.41	2.02	31.5	7
	mg/kg	LT1LS10		0.02	6.73	50	6.76	6.73	6.51	2.04	31.4	7
Cu	mg/kg	LT1F1			0.016		*<0,05*	0.016	0.016	0.012	73.3	5
	mg/kg	LT1F2					*<0,05*	0.004	0.007	0.010	132.5	4
	mg/kg	LT1F3			0.018		*<0,05*	0.018	0.014	0.009	62.2	5
	mg/kg	LT1F4			0.005		*<0,05*	0.005	0.005	0.004	75.4	4
	mg/kg	LT1F5					*<0,05*	0.005	0.004	0.003	75.3	3
	mg/kg	LT1F6					*<0,05*	0.003	0.008	0.011	141.8	3
	mg/kg	LT1F7					*<0,05*	0.03	0.04	0.04	111.2	3
	mg/kg	LT1LS_2			0.044		*<0,05*	0.044	0.047	0.028	58.8	5
	mg/kg	LT1LS10			0.054	50	*<0,05*	0.054	0.058	0.021	35.7	5
DOC	mg/kg	LT1F1			13.8		*<10*	13.8	14.6	3.3	22.4	4
	mg/kg	LT1F2			6.87		*<10*	6.87	10.69	8.00	74.8	5
	mg/kg	LT1F3			7.73		*<10*	7.73	9.99	7.01	70.2	5
	mg/kg	LT1F4			5.59		*<10*	5.59	5.10	2.12	41.5	5
	mg/kg	LT1F5			4.03		*<10*	4.03	3.57	1.75	49.1	4
	mg/kg	LT1F6			3.59		*<10*	3.59	4.37	3.37	77.2	4
	mg/kg	LT1F7			5.83		*<10*	4.29	8.12	9.76	120.3	4
	mg/kg	LT1LS_2			40.1		*<10*	40.1	45.2	23.7	52.4	4
	mg/kg	LT1LS10			54.7		*<10*	54.7	58.9	22.8	38.7	3
Hg	mg/kg	LT1F1					*<0,01*	0.0000	0.0000	0.0000	88.2	3
	mg/kg	LT1F2					*<0,01*	0.0000	0.0000	0.0000	58.9	3
	mg/kg	LT1F3					*<0,01*	0.0001	0.0001	0.0000	35.5	3
	mg/kg	LT1F4					*<0,01*	0.0001	0.0002	0.0002	103.5	4
	mg/kg	LT1F5					*<0,01*	0.0002	0.0001	0.0001	81.2	3
	mg/kg	LT1F6					*<0,01*	0.0002	0.0003	0.0003	106.6	3
	mg/kg	LT1F7					*<0,01*	0.0003	0.0004	0.0005	115.7	3
	mg/kg	LT1LS_2					*<0,01*	0.0004	0.0020	0.0030	147.1	3
	mg/kg	LT1LS10					*<0,01*	0.002	0.003	0.003	104.6	3

Participant 9												
Measurand	Unit	Sample	-3 0 3	z score	Assigned value	2×s_{pt} %	Participant's result	Md	Mean	sd	sd %	n (stat)
Mo	mg/kg	LT1F1			0.92		0.13	0.92	0.86	0.45	52.5	7
	mg/kg	LT1F2			0.27		0.18	0.27	0.33	0.21	64.9	6
	mg/kg	LT1F3			0.20		0.59	0.20	0.18	0.05	26.3	5
	mg/kg	LT1F4			0.05		0.58	0.05	0.06	0.04	63.0	5
	mg/kg	LT1F5			0.01		0.42	0.01	0.01	0.01	59.0	4
	mg/kg	LT1F6			0.003		0.095	0.003	0.003	0.002	81.7	4
	mg/kg	LT1F7					*<0,05*	0.013	0.019	0.022	118.3	4
	mg/kg	LT1LS_2		0.00	1.91	50	1.91	1.91	1.77	0.76	42.9	7
	mg/kg	LT1LS10		0.00	2.00	50	2.00	2.00	1.81	0.79	43.5	7
Ni	mg/kg	LT1F1					*<0,05*	0.001	0.001	0.001	57.5	3
	mg/kg	LT1F2					*<0,05*	0.0009	0.0012	0.0007	54.5	3
	mg/kg	LT1F3					*<0,05*	0.004	0.004	0.003	82.1	3
	mg/kg	LT1F4					*<0,05*	0.0003	0.0003	0.0003	117.4	2
	mg/kg	LT1F5					*<0,05*	0.0005	0.0005	0.0006	117.8	2
	mg/kg	LT1F6					*<0,05*	0.0015	0.0015	0.0021	132.9	2
	mg/kg	LT1F7					*<0,05*	0.003	0.003	0.003	121.9	2
	mg/kg	LT1LS_2					*<0,05*	0.007	0.007	0.004	63.7	2
	mg/kg	LT1LS10					*<0,05*	0.01	0.01	0.00	8.2	2
Pb	mg/kg	LT1F1			0.045		*<0,05*	0.05	0.05	0.02	34.7	4
	mg/kg	LT1F2			0.031		*<0,05*	0.031	0.031	0.019	59.4	4
	mg/kg	LT1F3			0.035		*<0,05*	0.035	0.033	0.020	61.9	5
	mg/kg	LT1F4			0.005		*<0,05*	0.005	0.005	0.003	66.3	4
	mg/kg	LT1F5					*<0,05*	0.001	0.001	0.001	70.4	3
	mg/kg	LT1F6					*<0,05*	0.002	0.002	0.001	86.4	3
	mg/kg	LT1F7					*<0,05*	0.003	0.003	0.003	129.2	2
	mg/kg	LT1LS_2			0.13	50	*<0,05*	0.13	0.11	0.04	33.7	5
	mg/kg	LT1LS10			0.14	50	*<0,05*	0.14	0.11	0.04	33.8	5
pH		LT1F1		-1.21	13.8	3,6	13.5	13.8	13.8	0.3	2.2	7
		LT1F2		-1.21	13.8	3,6	13.5	13.8	13.7	0.3	2.1	7
		LT1F3		-0.40	13.6	3,7	13.5	13.6	13.5	0.3	2.0	8
		LT1F4		0.80	13.1	3,8	13.3	13.1	13.2	0.4	2.7	8
		LT1F5		1.20	12.8	3,9	13.1	13.0	12.8	0.3	2.7	8
		LT1F6		2.02	12.1	4,1	12.6	12.1	12.1	0.3	2.6	8
		LT1F7		1.20	11.6	4,3	11.9	11.8	11.6	0.5	4.2	8
Sb	mg/kg	LT1F1			0.001		*<0,05*	0.001	0.001	0.000	3.2	3
	mg/kg	LT1F2			0.001		*<0,05*	0.001	0.001	0.001	38.0	4
	mg/kg	LT1F3			0.004		*<0,05*	0.003	0.003	0.001	16.6	4
	mg/kg	LT1F4			0.003		*<0,05*	0.003	0.003	0.002	64.8	4
	mg/kg	LT1F5					*<0,05*	0.004	0.004	0.005	101.8	4
	mg/kg	LT1F6					*<0,05*	0.007	0.012	0.016	125.5	3
	mg/kg	LT1F7					*<0,05*	0.008	0.019	0.027	137.7	3
	mg/kg	LT1LS_2			0.016		*<0,05*	0.016	0.023	0.019	84.0	4
	mg/kg	LT1LS10			0.052		*<0,05*	0.052	0.055	0.044	80.4	3
Se	mg/kg	LT1F1			0.16		*<0,05*	0.16	0.17	0.06	34.9	5
	mg/kg	LT1F2			0.049		*<0,05*	0.049	0.056	0.037	65.9	4
	mg/kg	LT1F3			0.047		0.079	0.047	0.049	0.018	37.3	6
	mg/kg	LT1F4			0.016		0.084	0.016	0.014	0.010	68.2	4
	mg/kg	LT1F5					0.07	0.01	0.03	0.04	139.8	3

Participant 9												
Measurand	Unit	Sample	-3 0 3	z score	Assigned value	2×s_{pt} %	Participant's result	Md	Mean	sd	sd %	n (stat)
Se, cont'd	mg/kg	LT1F6					*<0,05*	0.01	0.01	0.02	145.7	2
	mg/kg	LT1F7					*<0,05*	0.03	0.03	0.03	135.3	2
	mg/kg	LT1LS_2		-0.32	0.25	50	0.23	0.25	0.27	0.09	34.7	6
	mg/kg	LT1LS10		-0.83	0.29	50	0.23	0.29	0.28	0.10	35.4	6
SO_4	mg/kg	LT1F1			1869		2492	1869	1960	925	47.2	6
	mg/kg	LT1F2			2700		2509	2700	2941	971	33.0	6
	mg/kg	LT1F3			17200		6199	17200	16348	1448	8.9	5
	mg/kg	LT1F4			5559		7042	5559	5103	2688	52.7	6
	mg/kg	LT1F5			33.3		6474.0	33.3	49.4	45.9	93.1	4
	mg/kg	LT1F6			11.1		1741.0	11.1	11.2	5.1	45.5	4
	mg/kg	LT1F7			5.55		23.20	5.55	5.24	1.24	23.7	3
	mg/kg	LT1LS_2		-0.76	26755	20	24720	27680	26755	1512	5.7	5
	mg/kg	LT1LS10		-0.24	27123	20	26480	27700	27123	1059	3.9	5
V	mg/kg	LT1F1			8.66		1.38	8.66	7.78	3.73	48.0	6
	mg/kg	LT1F2			3.62		1.62	3.62	4.04	2.35	58.3	5
	mg/kg	LT1F3			5.59		5.00	5.59	5.23	1.62	31.0	6
	mg/kg	LT1F4			1.62		5.76	1.62	2.20	1.93	87.8	6
	mg/kg	LT1F5			0.16		4.63	0.16	0.14	0.05	37.3	4
	mg/kg	LT1F6			0.087		2.040	0.087	0.078	0.036	46.4	5
	mg/kg	LT1F7			0.029		0.150	0.029	0.035	0.012	34.7	5
	mg/kg	LT1LS_2		-0.19	19.3	50	18.4	19.3	19.4	6.0	31.1	6
	mg/kg	LT1LS10		0.04	20.4	50	20.6	20.4	19.9	6.1	30.5	6
Zn	mg/kg	LT1F1			38.6		5.5	38.6	33.5	17.4	51.9	7
	mg/kg	LT1F2			25.2		5.7	25.2	23.7	15.5	65.2	6
	mg/kg	LT1F3			24.7		17.7	24.7	21.9	13.5	61.8	7
	mg/kg	LT1F4			4.89		14.40	4.89	6.39	7.15	111.9	7
	mg/kg	LT1F5			0.22		5.74	0.22	0.27	0.15	53.8	5
	mg/kg	LT1F6			0.036		1.420	0.036	0.039	0.016	40.5	4
	mg/kg	LT1F7					0.53	0.08	0.22	0.27	119.2	3
	mg/kg	LT1LS_2		-1.89	92.7	50	49.0	92.7	82.7	36.9	44.6	7
	mg/kg	LT1LS10		-1.80	92.7	50	51.0	92.7	83.1	36.6	44.0	7

APPENDIX 7: Summary of the E_n scores

Measurand	Sample	1	2	3	4	5	6	7	8	9	%
As	LT1F1	.	.	1.3	-0.4	-0.4	-1.1	.	0.3	.	60.0
	LT1F2	.	.	0.0	3.7	1.2	-0.8	.	1.8	-0.3	50.0
	LT1F3	0.1	.	0.1	4.0	-1.3	-1.7	.	-0.3	0.8	57.1
	LT1F4	.	.	0.4	5.7	-0.4	-0.9	.	1.5	3.0	50.0
	LT1LS_2	-0.6	.	1.0	.	0.0	-1.4	.	0.9	0.0	83.3
	LT1LS10	-0.8	.	0.7	.	0.2	-1.6	.	0.8	-0.1	83.3
Ba	LT1F1	.	.	-1.4	-0.4	0.4	0.9	.	0.9	-0.9	83.3
	LT1F2	.	.	-1.6	0.7	0.4	-0.6	.	1.4	-0.3	66.7
	LT1F3	1.4	.	-0.9	-0.4	1.6	-0.8	.	0.7	0.0	71.4
	LT1F4	-2.2	.	0.6	2.6	-0.1	0.1	.	-0.2	0.8	71.4
	LT1F5	-1.0	.	-1.1	2.0	1.1	0.7	.	-1.1	1.2	14.3
	LT1F6	0.0	.	-1.0	-0.4	0.7	1.4	.	-0.3	1.0	71.4
	LT1F7	-1.9	.	-0.1	-2.0	0.6	0.2	.	0.3	0.1	71.4
	LT1LS_2	-0.5	.	-2.1	.	0.7	0.0	.	0.1	0.1	83.3
	LT1LS10	-1.7	.	-0.8	.	0.4	0.3	.	-0.1	0.1	83.3
Cd	LT1F1	.	.	0.7	3.6	-0.5	-1.1	.	0.6	.	60.0
	LT1F2	.	.	0.0	4.4	0.9	-1.3	.	-0.1	.	60.0
	LT1F3	.	.	0.1	4.8	2.1	0.0	.	.	.	50.0
	LT1LS_2	.	.	-0.5	.	0.6	.	.	-0.7	.	100
Cl	LT1F1	.	.	0.7	-0.2	0.2	-0.6	.	0.3	-2.3	83.3
	LT1F2	.	.	0.3	2.3	0.0	-1.5	.	0.2	-1.1	50.0
	LT1F3	0.0	.	0.0	5.7	0.0	-1.3	.	1.0	1.9	42.9
	LT1F4	0.0	.	-0.5	6.6	1.0	-1.3	.	1.3	3.9	42.9
	LT1F5	0.2	.	.	6.7	-0.2	-1.3	.	0.6	4.0	50.0
	LT1F6	1.4	.	.	6.7	0.1	-0.5	.	-0.1	3.8	50.0
	LT1F7	-0.2	.	.	.	-1.2	0.2	.	.	0.5	75.0
	LT1LS_2	-0.8	.	0.7	.	0.2	-1.7	.	0.5	-0.1	83.3
	LT1LS10	-0.9	.	0.6	.	0.1	-1.7	.	0.4	-0.1	83.3
Conductivity 25	LT1F1	.	.	3.0	0.0	0.4	-0.7	.	0.1	-2.1	66.7
	LT1F2	.	.	2.1	-0.1	0.0	-0.9	.	0.0	-1.1	66.7
	LT1F3	0.0	.	2.6	0.4	-0.5	-2.1	.	0.0	-1.0	71.4
	LT1F4	-0.7	.	0.6	0.3	-0.5	-2.9	.	-0.3	0.4	85.7
	LT1F5	-0.2	.	-0.2	1.0	0.2	-2.3	.	0.4	5.3	57.1
	LT1F6	-0.1	.	0.5	-0.2	0.3	-2.5	.	0.2	5.1	71.4
	LT1F7	-3.3	.	-0.5	-7.6	-0.4	1.2	.	-1.1	0.3	42.9
Cr	LT1F1	.	.	0.4	0.0	0.1	-0.9	.	0.5	-2.4	83.3
	LT1F2	.	.	-0.5	4.1	0.4	-1.2	.	1.3	-1.0	50.0
	LT1F3	0.0	.	-0.2	4.9	-0.2	-2.1	.	0.2	0.1	71.4
	LT1F4	-0.6	.	-0.5	4.0	0.0	-1.6	.	0.6	1.4	57.1
	LT1F5	0.7	.	-0.1	5.0	0.0	-1.2	.	1.6	2.4	42.9
	LT1F6	0.7	.	0.2	4.3	-1.2	-1.3	.	0.0	2.4	42.9
	LT1F7	.	.	0.0	4.0	-0.7	0.8	.	.	.	75.0
	LT1LS_2	-0.7	.	0.0	.	0.2	-1.7	.	0.8	0.0	83.3
	LT1LS10	-0.8	.	-0.1	.	0.0	-1.8	.	0.7	0.0	83.3
Cu	LT1F1	.	.	-1.1	1.0	-1.1	0.0	.	0.8	.	60.0
	LT1F3	0.3	.	0.2	2.3	-1.6	-1.0	.	0.0	.	66.7
	LT1F4	.	.	1.0	4.6	-0.5	-1.0	.	0.6	.	40.0
	LT1LS_2	0.9	.	0.0	.	-1.3	-0.7	.	1.0	.	80.0
	LT1LS10	0.8	.	0.0	.	0.0	-1.2	.	0.8	.	80.0

Measurand	Sample	1	2	3	4	5	6	7	8	9		%
DOC	LT1F1	.	.	0.2	-0.6	-0.2	2.3	.	0.8	.		80.0
	LT1F2	.	.	-0.9	1.6	-0.2	1.5	.	0.0	.		60.0
	LT1F3	0.0	.	-0.9	2.2	0.3	2.1	.	0.0	.		66.7
	LT1F4	-0.7	.	-1.6	3.6	0.4	0.5	.	0.0	.		66.7
	LT1F5	-0.1	.	.	.	-1.5	0.1	.	0.5	.		75.0
	LT1F6	-0.3	.	.	4.1	-0.8	1.2	.	0.3	.		60.0
	LT1F7	-0.6	.	.	.	-0.8	1.6	.	0.0	.		75.0
	LT1LS_2	1.1	.	-0.8	.	-0.2	2.8	.	0.2	.		60.0
	LT1LS10	0.7	.	.	.	-0.6	2.7	.	0.0	.		75.0
F	LT1F1	.	.	0.0	.	-1.2	0.2	.	0.1	.		75.0
	LT1F2	.	.	0.6	.	0.2	-1.4	.	-0.2	.		75.0
	LT1F3	0.0	.	0.6	.	1.4	-1.5	.	-0.2	.		60.0
	LT1F4	0.0	.	0.6	5.4	4.4	-1.4	.	0.0	.		50.0
	LT1F5	0.0	.	-0.2	6.3	1.2	-1.3	.	0.6	.		50.0
	LT1F6	0.8	.	.	6.3	0.5	-0.9	.	-0.5	.		80.0
	LT1LS_2	0.0	.	0.5	.	1.7	-1.2	.	0.0	.		60.0
	LT1LS10	0.0	.	0.4	.	1.5	-1.2	.	-0.1	.		60.0
Mo	LT1F1	.	.	1.5	0.0	0.0	-0.8	.	0.4	-2.1		66.7
	LT1F2	.	.	-0.4	3.5	0.4	-1.2	.	1.4	-0.6		50.0
	LT1F3	0.2	.	0.0	4.2	-0.7	-1.4	.	0.4	1.9		57.1
	LT1F4	0.3	.	0.0	4.9	0.0	-1.4	.	1.3	2.7		42.9
	LT1F5	.	.	0.1	4.7	0.0	-1.4	.	0.7	2.9		50.0
	LT1F6	.	.	0.4	-1.1	5.0	-0.6	.	0.6	2.8		50.0
	LT1LS_2	-1.3	.	0.2	.	-0.6	-1.6	.	0.2	0.0		66.7
	LT1LS10	-1.3	.	0.1	.	-0.6	-1.6	.	0.1	0.0		66.7
Pb	LT1F1	.	.	-0.3	4.1	0.3	-0.9	.	0.8	.		80.0
	LT1F2	.	.	-0.4	4.6	0.3	-1.1	.	0.9	.		60.0
	LT1F3	0.1	.	1.1	4.1	0.0	-1.2	.	-0.9	.		50.0
	LT1F4	.	.	1.0	4.9	-0.3	-1.1	.	0.0	.		40.0
	LT1LS_2	-0.6	.	0.1	.	0.0	-1.8	.	0.2	.		80.0
	LT1LS10	-0.7	.	-0.1	.	-0.1	-1.9	.	0.0	.		80.0
pH	LT1F1	.	.	0.2	2.2	-0.5	-1.2	.	0.4	-0.4		66.7
	LT1F2	.	.	0.2	1.0	-0.7	-2.2	.	0.4	-0.4		66.7
	LT1F3	-0.1	.	0.2	1.5	-0.6	-2.5	.	0.4	-0.1		71.4
	LT1F4	0.0	.	0.7	1.7	-0.5	-1.6	.	1.2	0.3		57.1
	LT1F5	-0.1	.	0.5	0.9	-0.4	-2.0	.	0.9	0.4		85.7
	LT1F6	0.0	.	0.7	0.0	0.0	-1.3	.	0.7	0.8		85.7
	LT1F7	0.0	.	0.8	-2.4	0.3	0.6	.	0.8	0.4		85.7
Sb	LT1F1	.	.	0.9	0.8	0.6	2.2	.	1.9	.		60.0
	LT1F2	.	.	0.0	1.7	0.0	2.2	.	1.2	.		40.0
	LT1F3	.	.	-1.1	0.0	-0.9	2.2	.	-0.1	.		60.0
	LT1F4	.	.	-0.2	1.0	0.8	-1.2	.	0.0	.		60.0
	LT1LS_2	.	.	-0.5	.	0.3	1.4	.	-0.3	.		75.0
	LT1LS10	.	.	.	.	0.9	0.0	.	-0.8	.		100
Se	LT1F1	.	.	1.5	-0.4	-0.1	-0.8	.	0.5	.		80.0
	LT1F2	.	.	-0.2	3.1	0.2	-0.9	.	1.3	.		60.0
	LT1F3	0.0	.	0.4	2.6	-0.3	-1.5	.	0.0	1.2		57.1
	LT1F4	.	.	0.2	3.2	-0.2	-1.4	.	0.6	2.5		50.0
	LT1LS_2	-0.5	.	1.0	.	0.3	-1.0	.	1.0	-0.2		66.7
	LT1LS10	-0.9	.	0.6	.	0.6	-1.3	.	0.6	-0.6		83.3

Measurand	Sample	1	2	3	4	5	6	7	8	9		%
SO_4	LT1F1	.	.	-1.6	-0.1	-0.5	1.0	.	0.0	0.6		83.3
	LT1F2	.	.	-1.4	1.4	-0.1	0.8	.	0.1	-0.2		66.7
	LT1F3	0.0	.	0.2	0.0	-1.1	-3.3	.	-0.5	-5.3		57.1
	LT1F4	-0.4	.	0.8	4.5	0.4	-2.2	.	-0.4	0.5		71.4
	LT1F5	0.0	.	0.0	6.7	2.4	-0.6	.	3.3	4.0		42.9
	LT1F6	-0.2	.	.	6.7	0.2	-1.1	.	0.9	4.0		50.0
	LT1F7	-0.9	.	.	6.7	0.0	2.0	.	0.3	2.9		50.0
	LT1LS_2	0.1	.	0.2	.	-0.4	-2.6	.	0.1	-0.3		83.3
	LT1LS10	0.1	.	0.1	.	-0.4	-2.7	.	0.1	-0.1		83.3
V	LT1F1	.	.	0.6	0.1	-0.1	-0.8	.	0.5	-2.1		83.3
	LT1F2	.	.	0.0	4.1	0.5	-0.5	.	1.4	-1.0		50.0
	LT1F3	0.2	.	0.7	5.2	-0.2	-2.3	.	0.2	-0.3		71.4
	LT1F4	-0.3	.	-0.2	6.6	0.2	-1.2	.	0.8	2.0		57.1
	LT1F5	0.1	.	-0.1	7.6	0.3	-1.6	.	2.2	3.2		42.9
	LT1F6	0.0	.	0.0	8.3	-0.4	-1.8	.	0.6	3.2		57.1
	LT1F7	-0.3	.	0.0	4.8	1.6	1.4	.	-0.3	2.6		42.9
	LT1LS_2	-0.6	.	0.6	.	0.1	-1.6	.	0.9	-0.1		83.3
	LT1LS10	-0.7	.	0.4	.	0.0	-1.7	.	0.8	0.0		83.3
Zn	LT1F1	.	.	0.9	0.2	0.0	-1.2	.	0.4	-2.2		66.7
	LT1F2	.	.	0.9	2.6	0.3	-1.4	.	0.9	-1.4		50.0
	LT1F3	0.0	.	1.1	4.5	0.4	-1.5	.	-1.9	-0.5		42.9
	LT1F4	-1.1	.	0.0	7.6	0.3	-1.0	.	-1.1	1.5		28.6
	LT1F5	0.0	.	-0.2	8.3	1.3	-1.2	.	1.2	2.7		28.6
	LT1F6	-0.8	.	0.2	2.6	2.9	0.9	.	-0.2	2.8		57.1
	LT1LS_2	-0.8	.	1.0	.	0.3	-1.8	.	0.0	-1.2		66.7
	LT1LS10	-0.9	.	0.9	.	0.3	-1.8	.	0.0	-1.2		66.7
%		85		83	26	82	30		83	50		

E_n scores enable to estimate the proximity of participant results to the assigned value taking into consideration their reported expanded uncertainty

Scores of $-1.0 < E_n < 1.0$ indicate successful performance

Scores of $E_n \geq 1.0$ or $E_n \leq -1.0$ indicate a need to review the uncertainty estimated or to correct a measurement issue

Totally satisfactory, % in all: 64

APPENDIX 8: Summary of the z scores

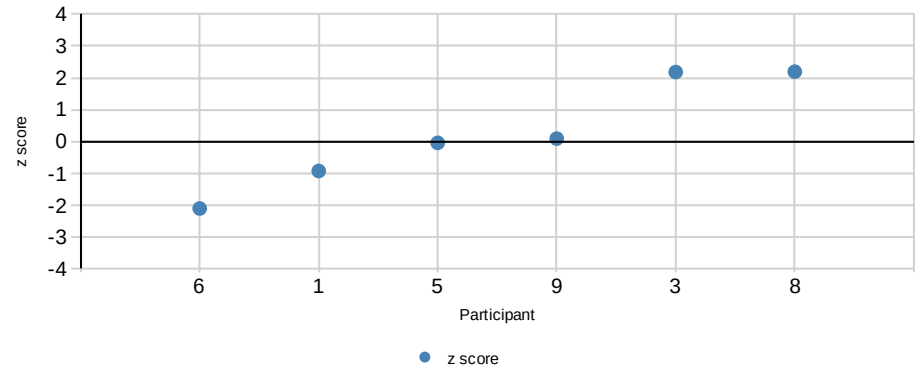
Measurand	Sample	1	2	3	4	5	6	7	8	9		%
As	LT1LS_2	S	.	*Q*	.	S	q	.	Q	S	. . . . .	50.0
	LT1LS10	S	.	*S*	.	S	q	.	S	S	. . . . .	83.3
Ba	LT1LS_2	S	.	*q*	.	S	S	.	S	S	. . . . .	83.3
	LT1LS10	S	.	*S*	.	S	S	.	S	S	. . . . .	100
Cl	LT1LS_2	S	.	*S*	.	S	q	.	S	S	. . . . .	83.3
	LT1LS10	S	.	*S*	.	S	q	.	S	S	. . . . .	83.3
Cr	LT1LS_2	S	*S*	*S*	.	S	q	.	S	S	. . . . .	85.7
	LT1LS10	S	*S*	*S*	.	S	q	.	S	S	. . . . .	85.7
Cu	LT1LS10	S	.	*S*	.	S	S	.	S	.	. . . . .	100
Mo	LT1LS_2	S	*Q*	*S*	.	S	q	.	S	S	. . . . .	71.4
	LT1LS10	S	*Q*	*S*	.	S	q	.	S	S	. . . . .	71.4
Pb	LT1LS_2	S	.	S	.	S	q	.	S	.	. . . . .	80.0
	LT1LS10	S	.	*S*	.	S	q	.	S	.	. . . . .	80.0
pH	LT1F1	.	*S*	*S*	*Q*	S	S	.	S	S	. . . . .	85.7
	LT1F2	.	*S*	*S*	*S*	S	q	.	S	S	. . . . .	85.7
	LT1F3	S	*S*	*S*	*S*	S	S	.	S	S	. . . . .	100
	LT1F4	S	*S*	*S*	*S*	S	S	.	Q	S	. . . . .	87.5
	LT1F5	S	*S*	*S*	*S*	S	q	.	S	S	. . . . .	87.5
	LT1F6	S	*S*	*S*	*S*	S	S	.	S	Q	. . . . .	87.5
	LT1F7	S	*q*	*S*	*u*	S	S	.	S	S	. . . . .	75.0
Se	LT1LS_2	S	.	*Q*	.	S	S	.	Q	S	. . . . .	66.7
	LT1LS10	S	.	*S*	.	S	S	.	S	S	. . . . .	100
SO_4	LT1LS_2	S	.	*S*	.	S	u	.	S	S	. . . . .	83.3
	LT1LS10	S	.	*S*	.	S	u	.	S	S	. . . . .	83.3
V	LT1LS_2	S	.	*S*	.	S	S	.	S	S	. . . . .	100
	LT1LS10	S	.	*S*	.	S	S	.	S	S	. . . . .	100
Zn	LT1LS_2	S	*S*	*S*	.	S	q	.	S	S	. . . . .	85.7
	LT1LS10	S	*S*	*S*	.	S	q	.	S	S	. . . . .	85.7
%		100	79	90	71	100	41		90	96		
accredited		27				29	29		29	26		

S - satisfactory (-2 ≤ z ≤ 2), Q - questionable (2 < z < 3), q - questionable (-3 < z < -2),
U - unsatisfactory (z ≥ 3), and u - unsatisfactory (z ≤ -3), respectively
bold - accredited, italics - non-accredited or other
% - percentage of satisfactory results

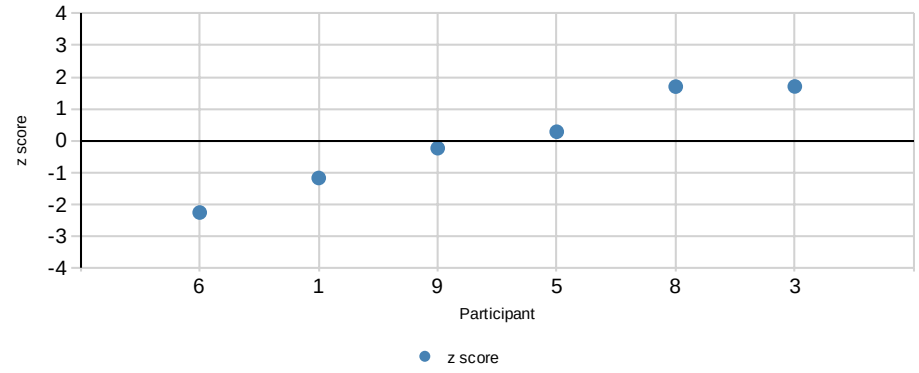
Totally satisfactory, % in all: 85 % in accredited: 85 % in non-accredited: 84

APPENDIX 9: z scores in ascending order

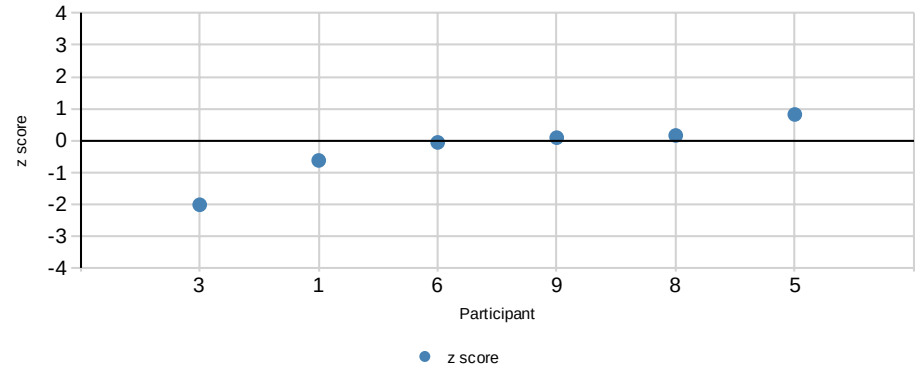
Measurand As Sample LT1LS_2



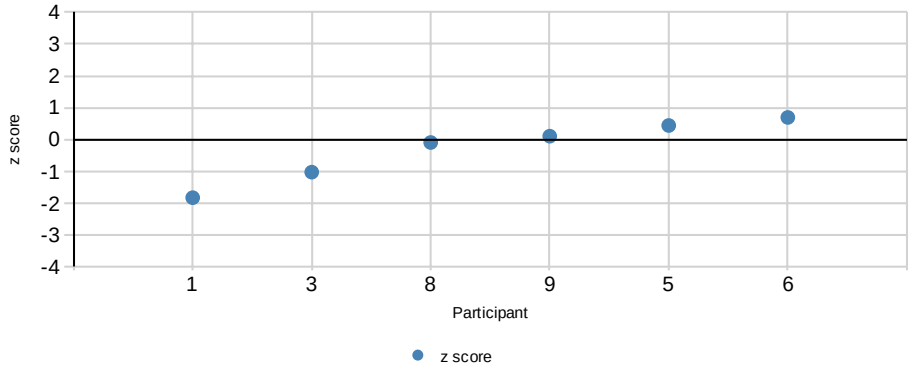
Measurand As Sample LT1LS10



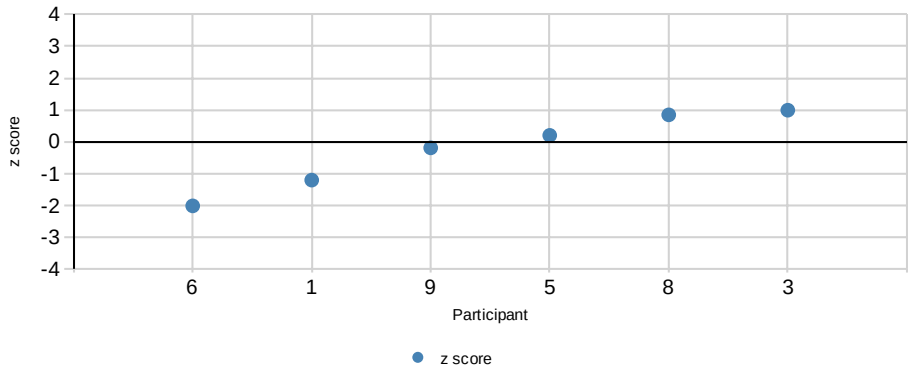
Measurand Ba Sample LT1LS_2



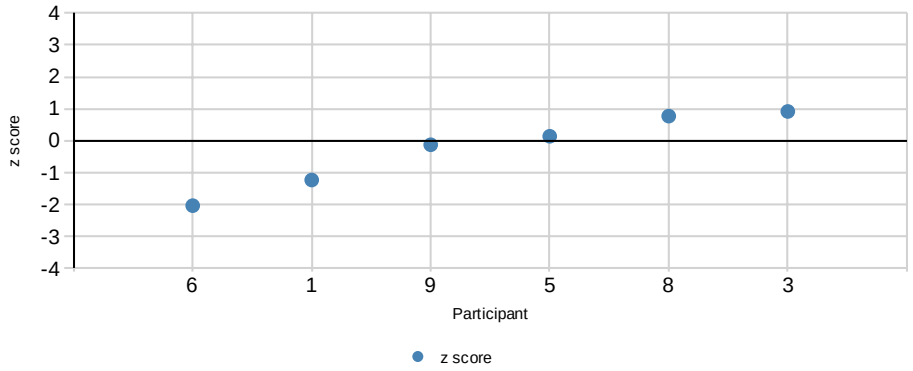
Measurand Ba Sample LT1LS10



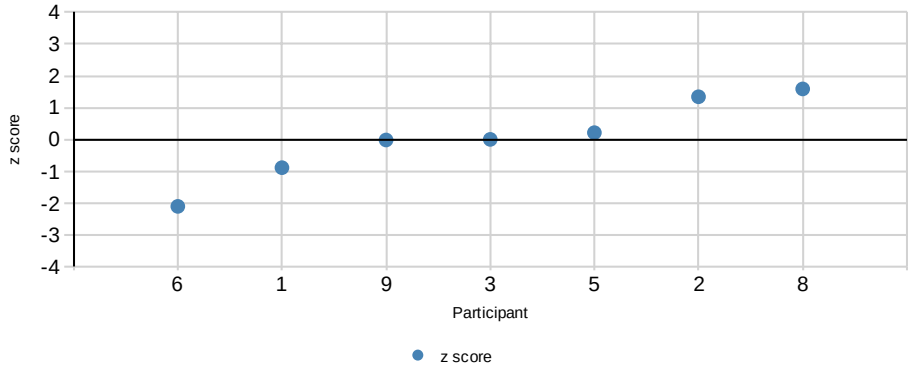
Measurand Cl Sample LT1LS_2



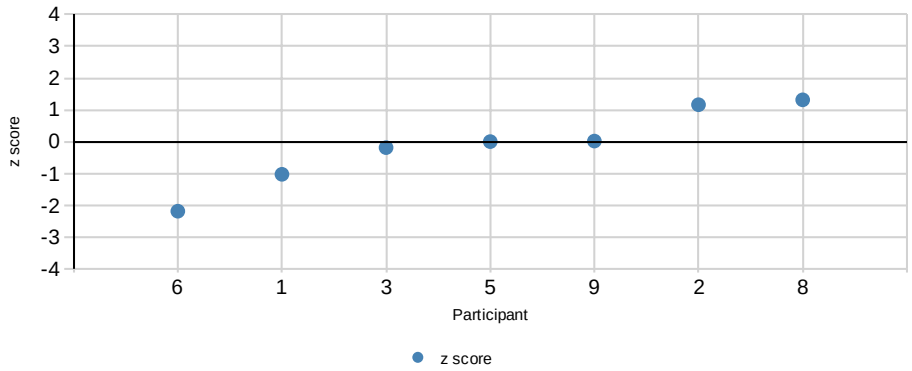
Measurand Cl Sample LT1LS10



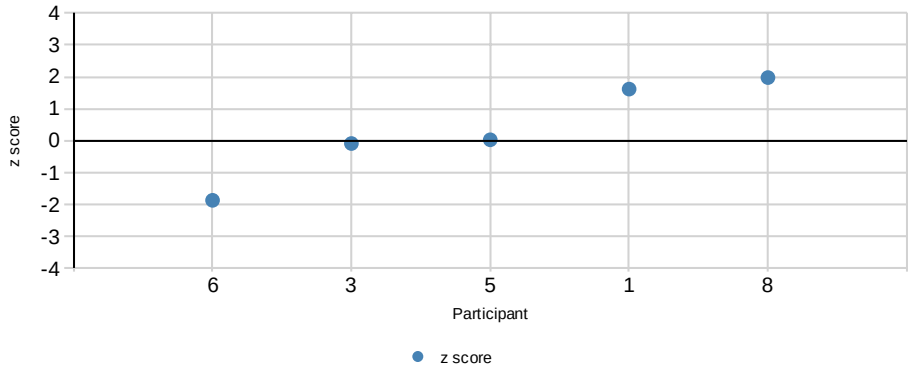
Measurand Cr Sample LT1LS_2



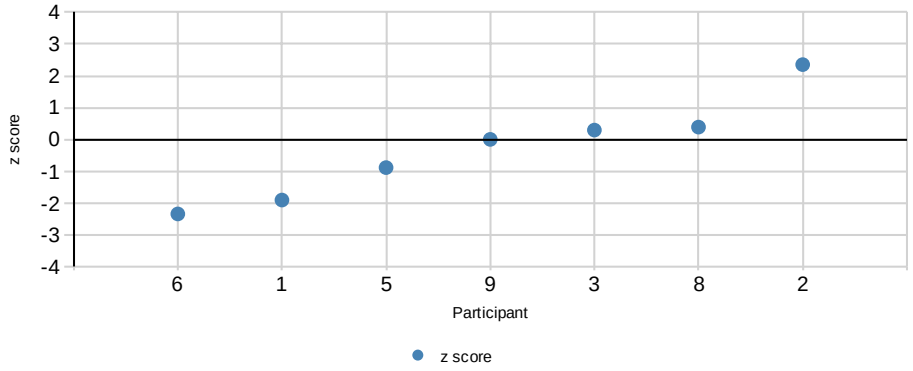
Measurand Cr Sample LT1LS10



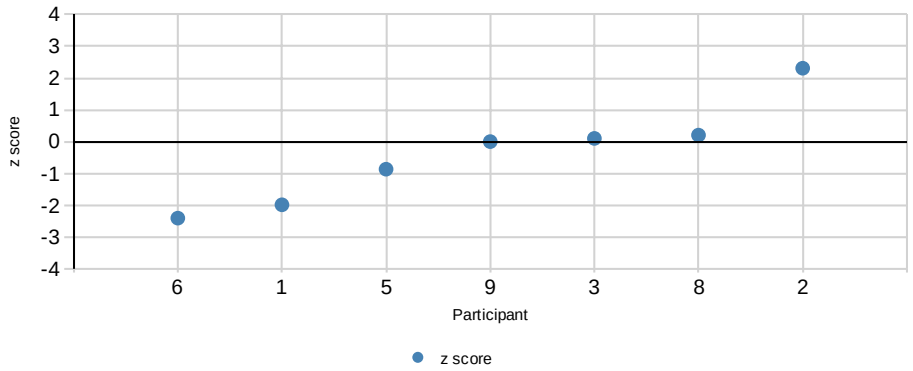
Measurand Cu Sample LT1LS10



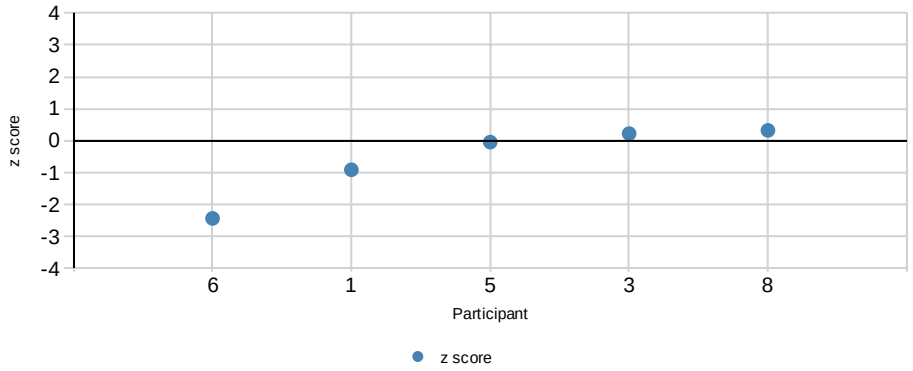
Measurand Mo Sample LT1LS_2



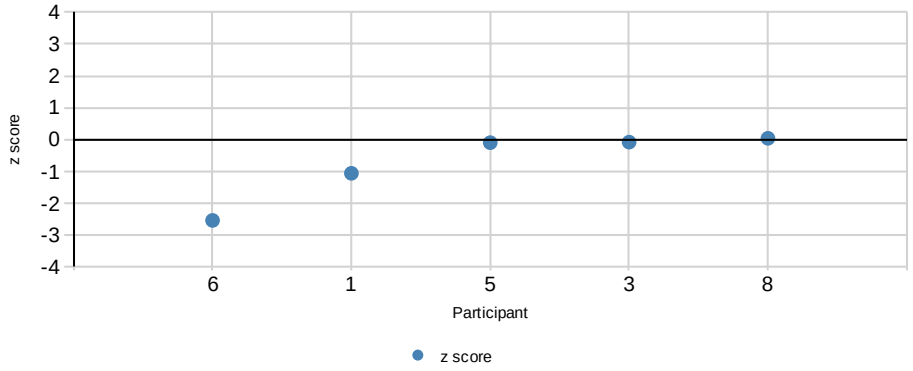
Measurand Mo Sample LT1LS10



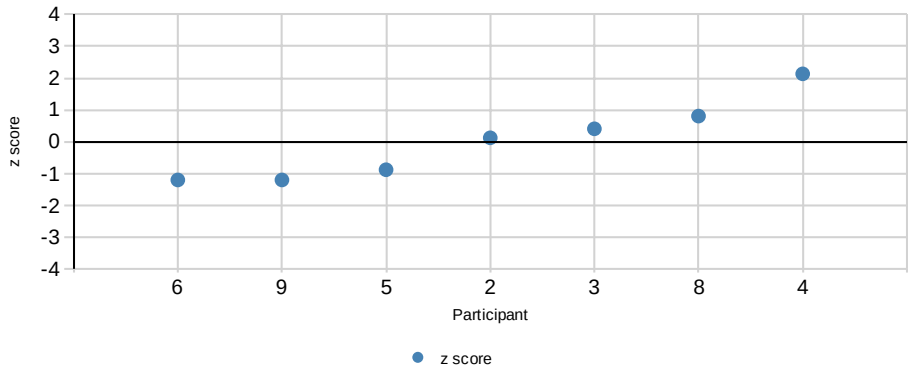
Measurand Pb Sample LT1LS_2



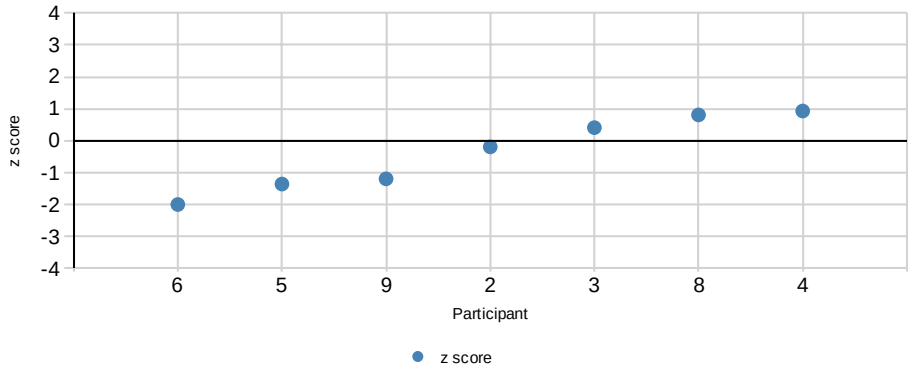
Measurand Pb Sample LT1LS10



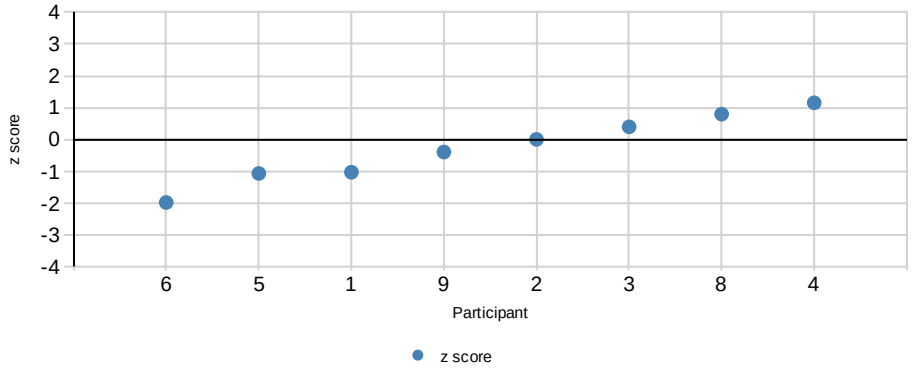
Measurand pH Sample LT1F1



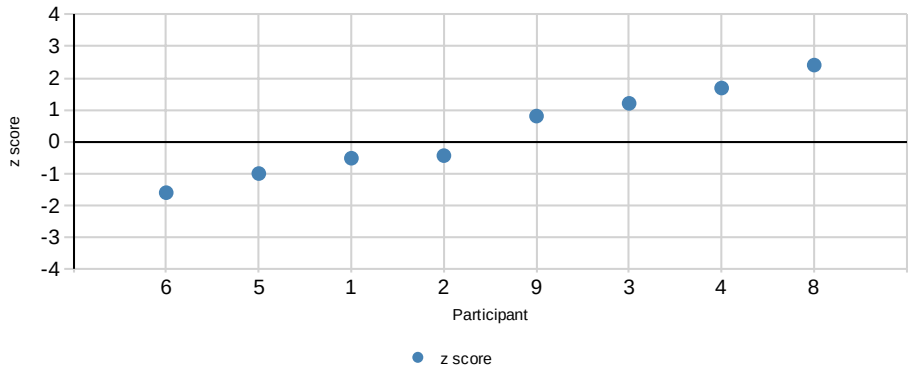
Measurand pH Sample LT1F2



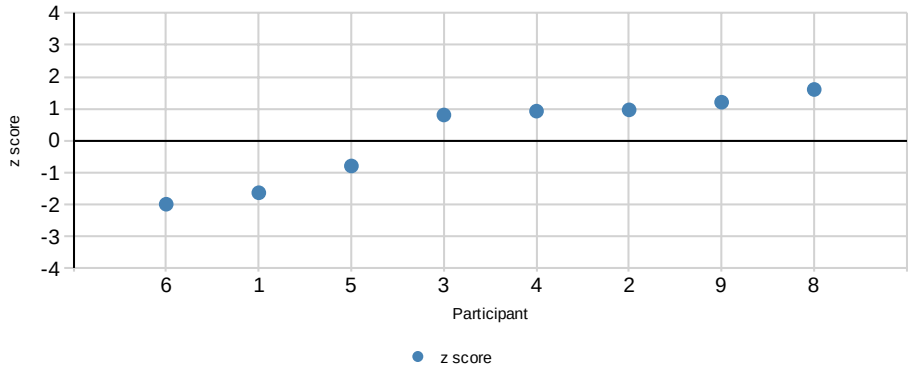
Measurand pH Sample LT1F3



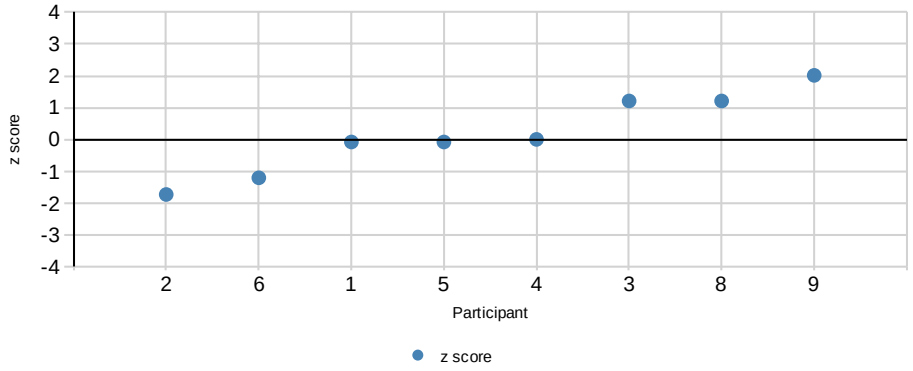
Measurand pH Sample LT1F4



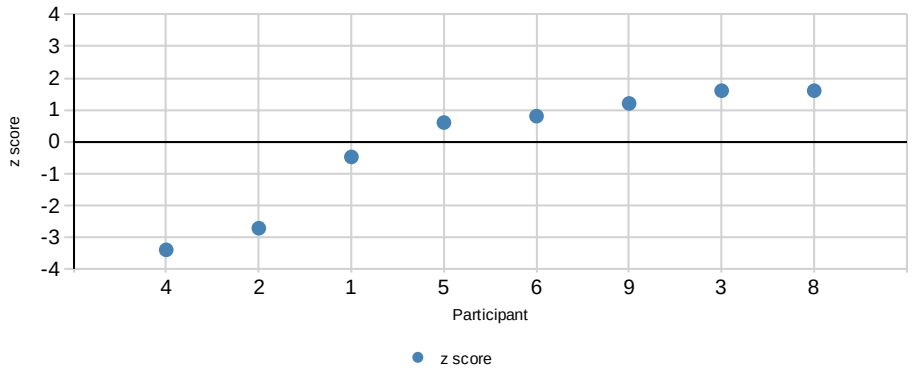
Measurand pH Sample LT1F5



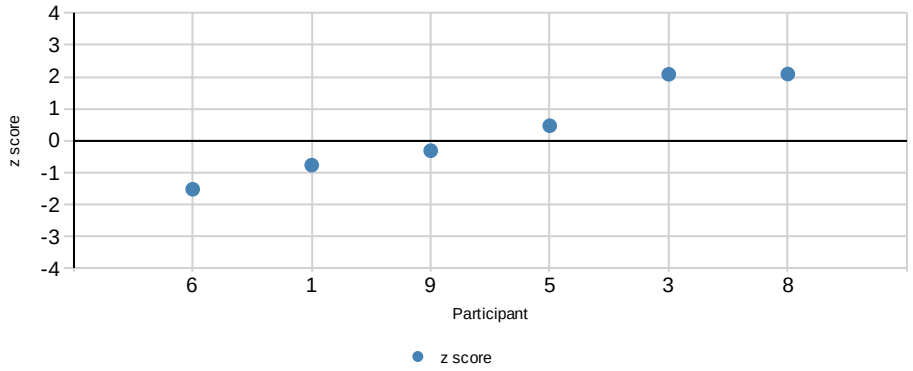
Measurand pH Sample LT1F6



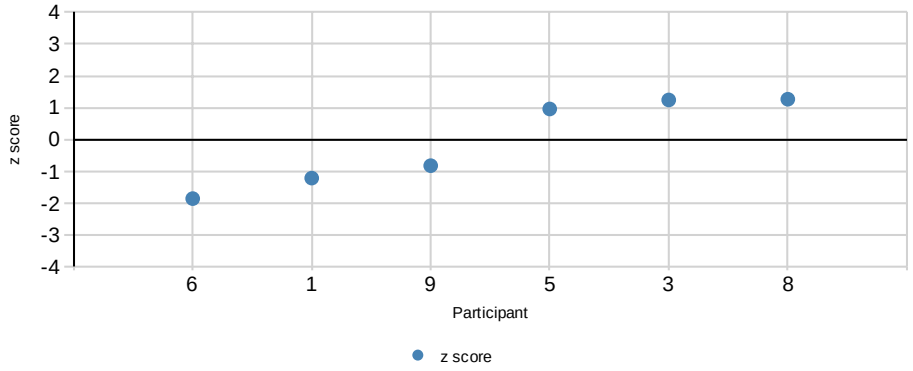
Measurand pH Sample LT1F7



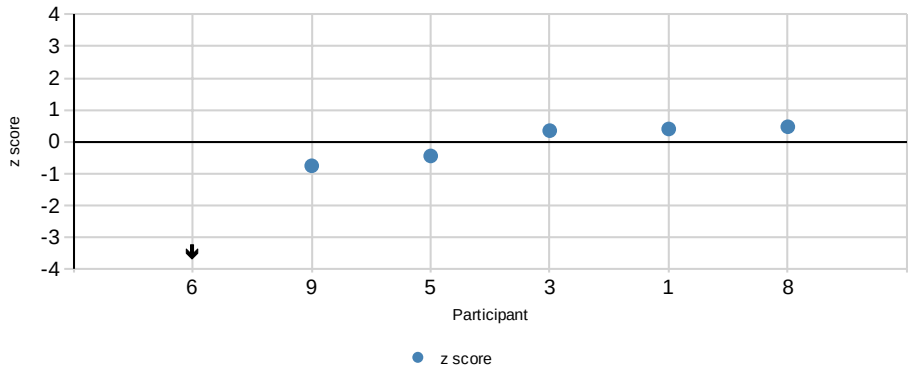
Measurand Se Sample LT1LS_2



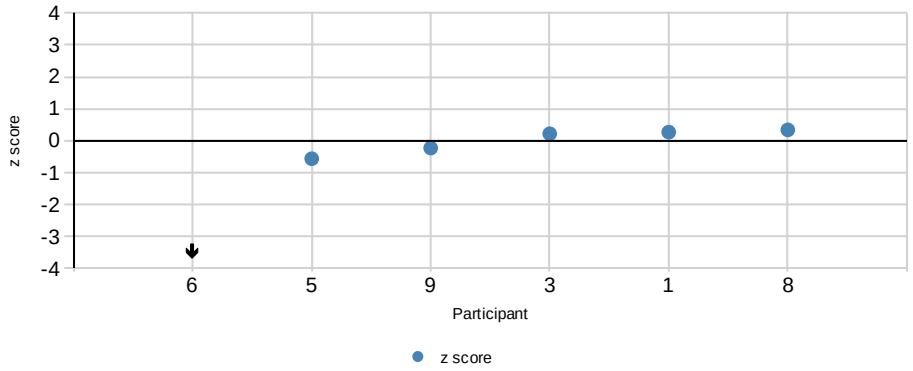
Measurand Se Sample LT1LS10



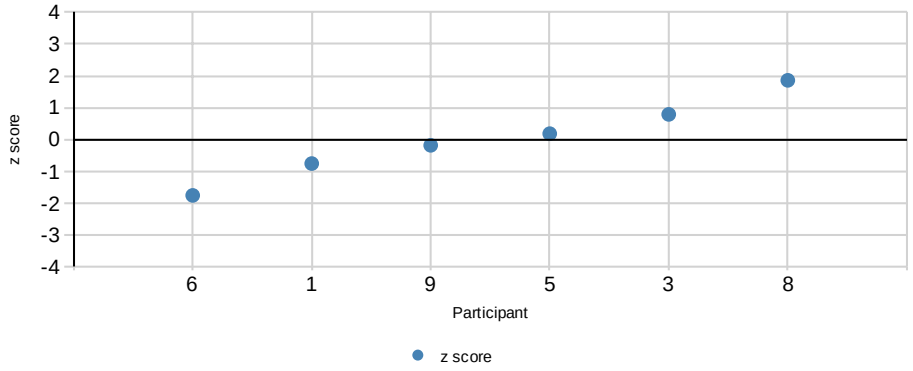
Measurand SO_4 Sample LT1LS_2



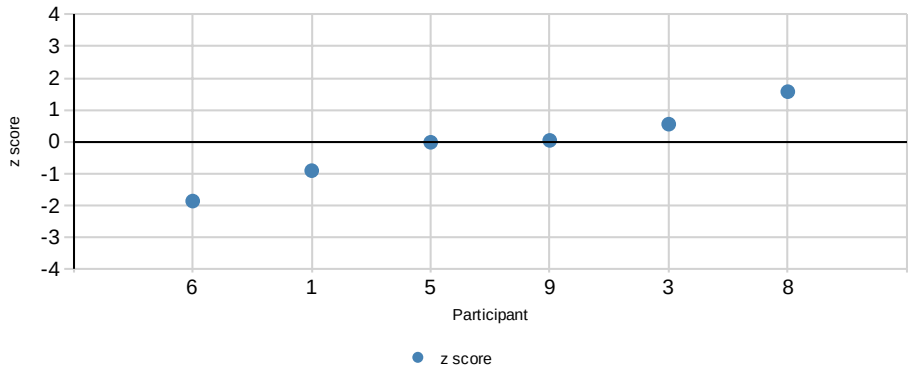
Measurand SO_4 Sample LT1LS10



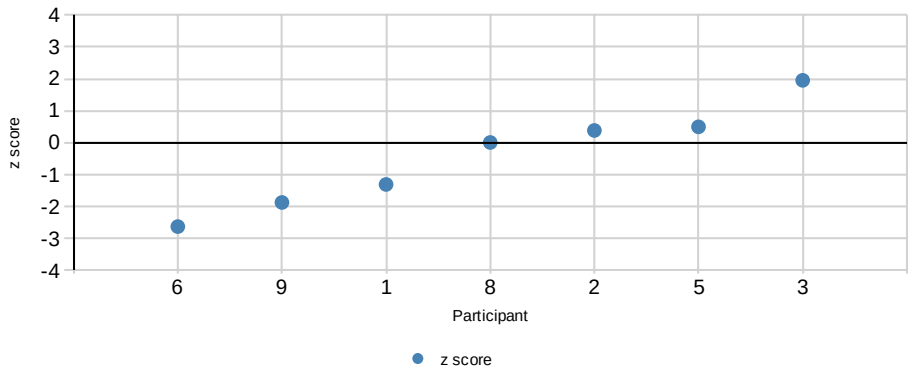
Measurand V Sample LT1LS_2

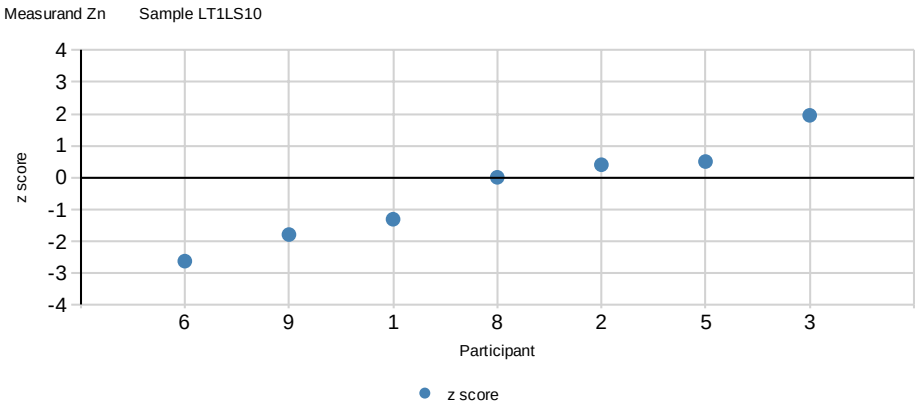


Measurand V Sample LT1LS10



Measurand Zn Sample LT1LS_2




Measurand Zn
Sample LT1LS10
z score
4
3
2
1
0
-1
-2
-3
-4
6
9
1
8
2
5
3
Participant
z score

APPENDIX 10: Up-flow percolation test, background information

Participant	Start date of the up-flow percolation test	Sample amount, Mw (kg)	Description of the column: length, diameter	DURATION OF THE FRACTION							End date of the up-flow percolation test	How do you treat, in general, the results which are below the limit of detection when reporting the cumulative results (e.g. L/S 2 or L/S 10) to the customers?
				Fraction 1, L/S 0.1	Fraction 2, L/S 0.1	Fraction 3, L/S 0.3	Fraction 4, L/S 0.5	Fraction 5, L/S 1.0	Fraction 6, L/S 3.0	Fraction 7, L/S 5.0		
2	24.1.2018	0.5905	Plexi-glass column Length: 35 cm Diameter: 5 cm	5 h	5 h	15 h	25 h	50 h	154 h	252 h	15.2.2018	If the concentration of a component in a specified fraction is below the detection limit, the calculation of the cumulative amount is carried out by taking the value equal to the detection limit.
3	8.1.2018	0.826	Lenght: 30 cm, Diameter: 5.64 cm	5 h 30 min	5 h 25 min	17 h	28 h	61 h	173 h	264 h	31.1.2018	As in most cases there is no practical significance for the results intepretation, they are mostly calculated in. In the future, when the LIMS system is compatible, we will be using upper/lower procedure.
4	4.1.2018	743.3	Actual column lenght: 44 cm Length: 30 cm of sample in column Diameter: 5 cm	2.5 h	2 h 12 min (L/S 0.2)	2 h 48 min (L/S 0.5)	22 h (L/S 1)	18 h 10 min	60 h 6 min (This is L/S 2 for us not 3)	86 h 36 min	29.1.2018	
5	5.1.2018	0.5693	Length: 32 cm Diameter: 5 cm	4 h 37 min	4 h 37 min	13 h 53 min	23 h 8 min	1 d 22 h 17 min	5 d 18 h 51 min	9 d 15 h 26 min	29.1.2018	According to standard.
6	5.1.2018	0.4287	Length: 30cm Diameter: 5cm	4 h	5 h	34.5 h	30 h	34 h	3 d 2.5 h	18 d 2.3 h	2.2.2018	Conservative estimates based on LOQ and the L/S fraction.
8	8.1.2018	0.5632	Lenght: 30 cm Diameter: 5.4 cm	5 h 6 min	3 h 57 min	17 h 44 min	23 h 5 min	48 h 5 min	123 h 57 min	213 h 6 min	26.1.2018	The results are definied as lower results.
9	15.1.2018	0.45	Lenght: 35 cm Diameter: 5 cm	3.5 h	3.5 h	12 h	18.5 h	37 h	140 h	192 h	2.2.2018	Lower limit value

APPENDIX 11: Method of analysis by measurands

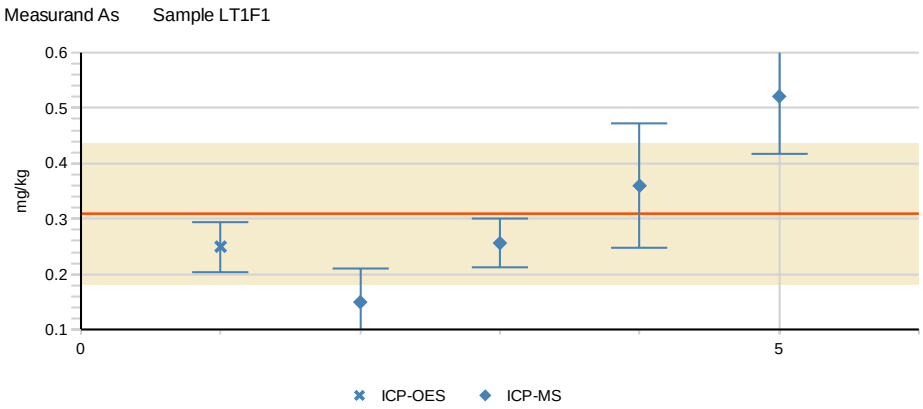
Measurand	Standard options	No. of participants		No. of participants
As (n=7, the number of participants who answered)	EN ISO 11885:2009	1	Modified	1
	EN ISO 17294-1:2006	3	Applied standard	3
	EN ISO 17294-2:2004	4	Applied standard	4
	Other method	2	Applied standard: EN ISO 17294-2:2016	2
Ba n=7	EN ISO 11885:2009	1	Modified	1
	EN ISO 17294-1:2006	3	Applied standard	3
	EN ISO 17294-2:2004	4	Applied standard	4
	Other method	2	Applied standard: EN ISO 17294-2:2016	2
Cd n=7	EN ISO 11885:2009	1	Modified	1
	EN ISO 17294-1:2006	3	Applied standard	3
	EN ISO 17294-2:2004	4	Applied standard	4
	Other method	2	Applied standard: EN ISO 17294-2:2016	2
Cl^- n=6	EN ISO 10304-1:2009	6	Applied standard	6
Conductivity n=7	EN 27888:1993	7	Applied standard	7
Cr n=7	EN ISO 11885:2009	1	Modified	1
	EN ISO 17294-1:2006	3	Applied standard	3
	EN ISO 17294-2:2004	4	Applied standard	4
	Other method	2	Applied standard: EN ISO 17294-2:2016	2
Cu n=7	EN ISO 11885:2009	1	Modified	1
	EN ISO 17294-1:2006	3	Applied standard	3
	EN ISO 17294-2:2004	4	Applied standard	4
	Other method	2	Applied standard: EN ISO 17294-2:2016	2
DOC n=6	EN 1484:1997	6	Applied standard	6
F^- n=5	EN ISO 10304-1:2009	5	Applied standard	5
Mo n=7	EN ISO 11885:2009	1	Modified	1
	EN ISO 17294-1:2006	3	Applied standard	3
	EN ISO 17294-2:2004	4	Applied standard	4
	Other method	2	Applied standard: EN ISO 17294-2:2016	2
Ni n=7	EN ISO 11885:2009	1	Modified	1
	EN ISO 17294-1:2006	3	Applied standard	3
	EN ISO 17294-2:2004	4	Applied standard	4
	Other method	2	Applied standard: EN ISO 17294-2:2016	2
Pb n=7	EN ISO 11885:2009	1	Modified	1
	EN ISO 17294-1:2006	3	Applied standard	3
	EN ISO 17294-2:2004	4	Applied standard	4
	Other method	2	Applied standard: EN ISO 17294-2:2016	2
pH n=8	ISO 10523:2008	6	Applied standard	6
	Other	1	Internal method, based on this standard EN ISO 10523:2012	1
Sb	EN ISO 11885:2009	1	Modified	1

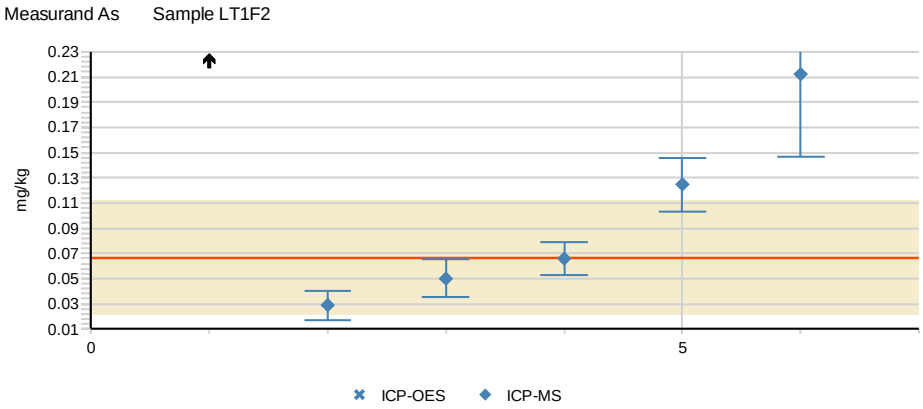
Measurand	Standard options	No. of participants		No. of participants
n=6	EN ISO 17294-1:2006	2	Applied standard	2
	EN ISO 17294-2:2004	3	Applied standard	3
	Other method	2	Applied standard: EN ISO 17294-2:2016	2
Se n=7	EN ISO 11885:2009	1	Modified	1
	EN ISO 17294-1:2006	3	Applied standard	3
	EN ISO 17294-2:2004	4	Applied standard	4
	Other method	2	Applied standard: EN ISO 17294-2:2016	2
SO_4^{2-} n=6	EN ISO 10304-1:2009	6	Applied standard	6
V n=6	EN ISO 11885:2009	1	Modified	1
	EN ISO 17294-1:2006	2	Applied standard	2
	EN ISO 17294-2:2004	3	Applied standard	3
	Other method	2	Applied standard: EN ISO 17294-2:2016	2
Zn n=7	EN ISO 11885:2009	1	Modified	1
	EN ISO 17294-1:2006	3	Applied standard	3
	EN ISO 17294-2:2004	4	Applied standard	4
	Other method	2	Applied standard: EN ISO 17294-2:2016	2

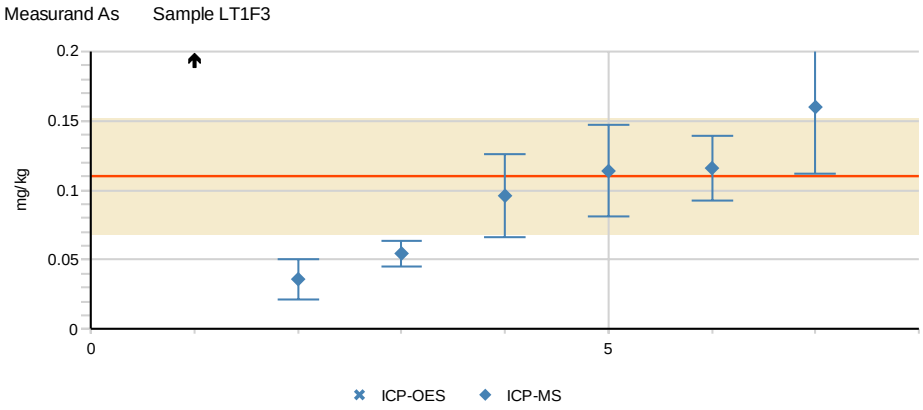
APPENDIX 12: Results grouped according to the methods

The dashed lines in figures describe the standard deviation for the proficiency assessment, the red solid line shows the assigned value, the shaded area describes the expanded measurement uncertainty of the assigned value, and the arrow describes the value outside the scale.

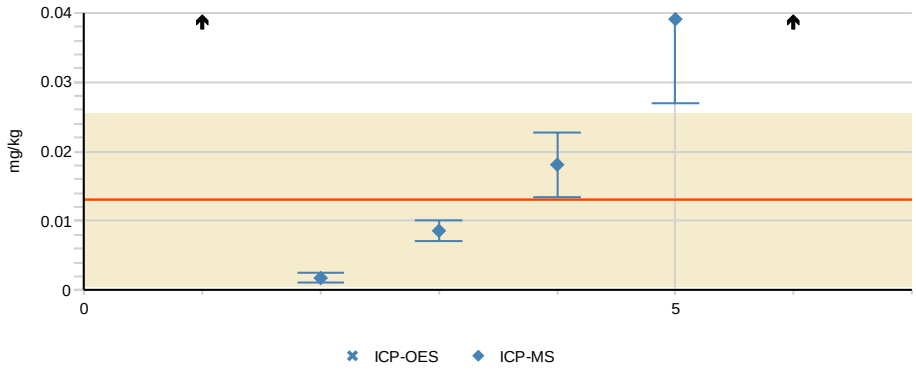
The results are shown in ascending order.



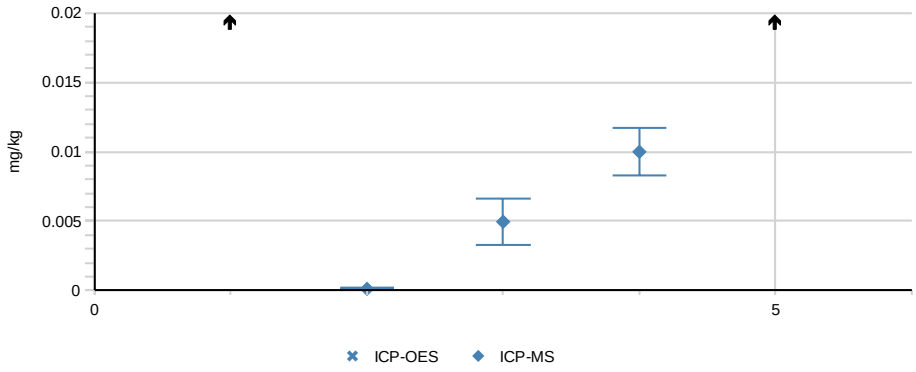




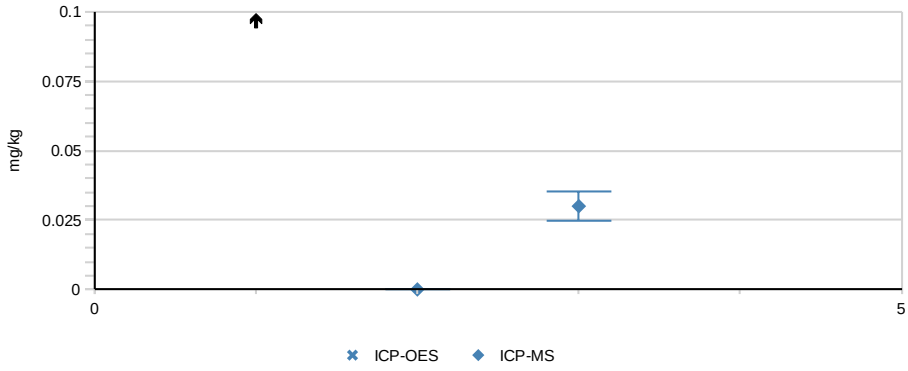
Measurand As Sample LT1F4



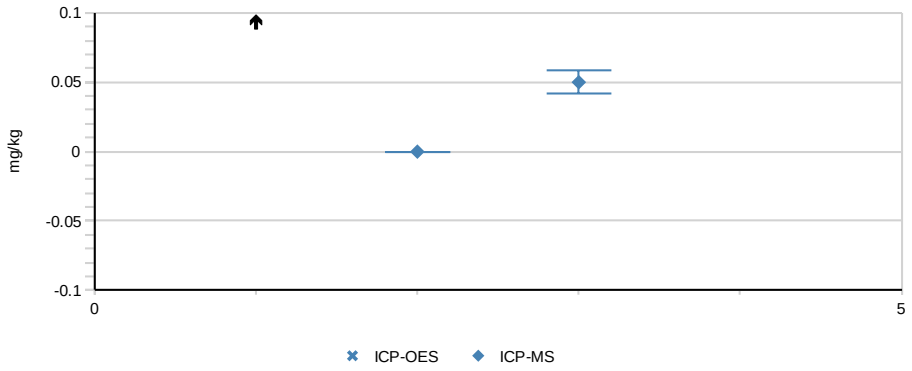
Measurand As Sample LT1F5



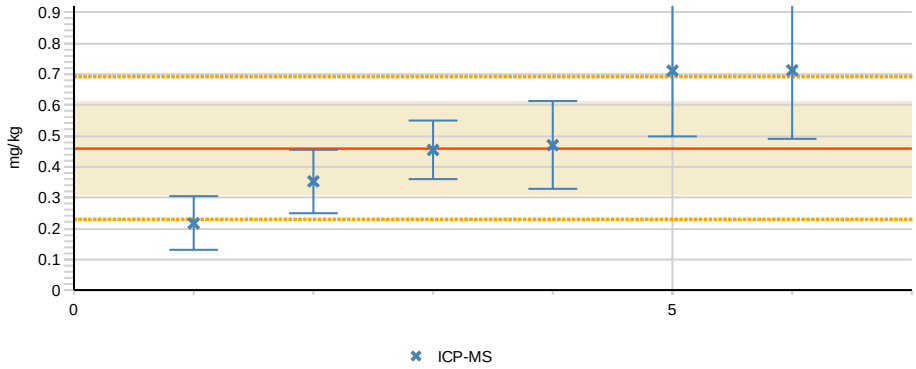
Measurand As Sample LT1F6



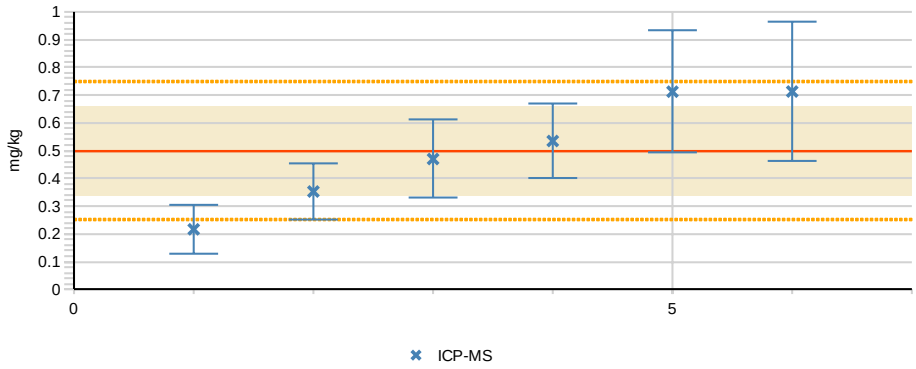
Measurand As Sample LT1F7



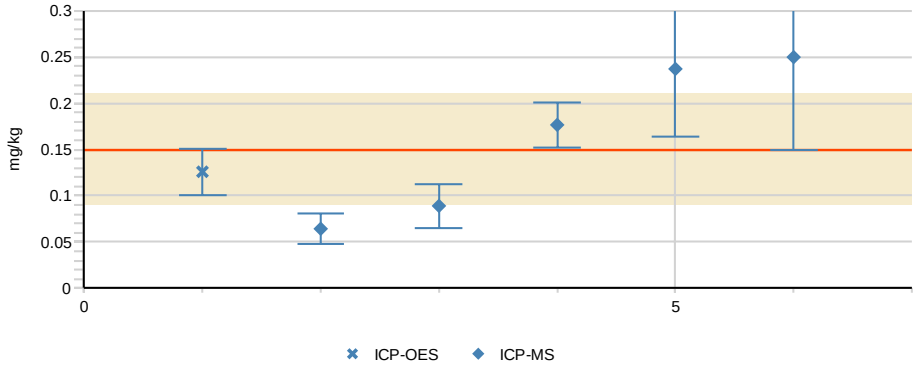
Measurand As Sample LT1LS_2



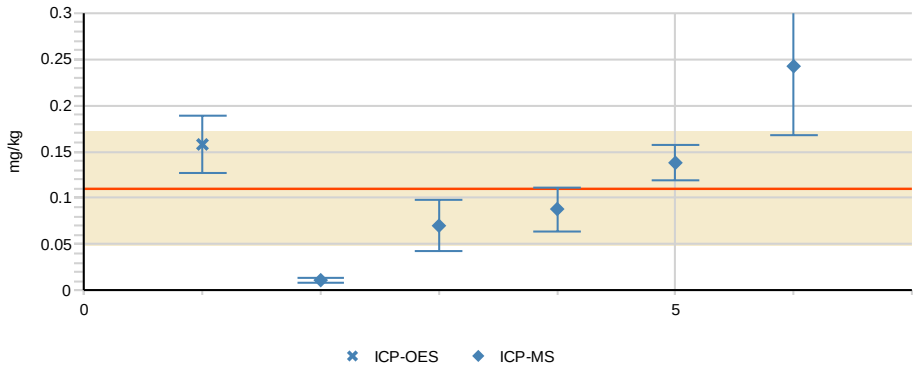
Measurand As Sample LT1LS10



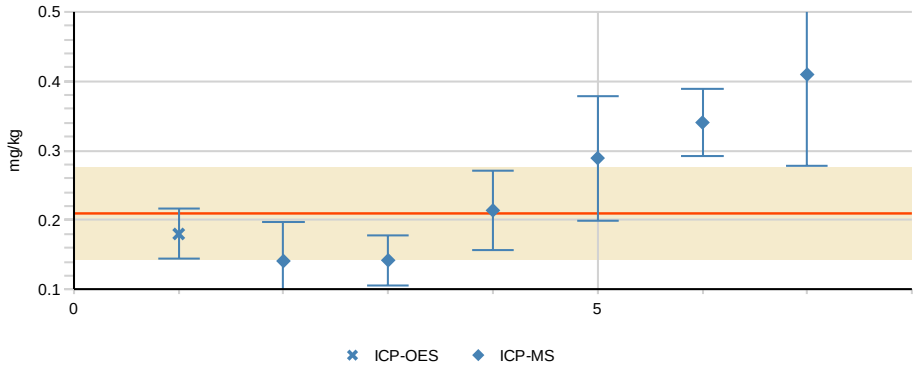
Measurand Ba Sample LT1F1



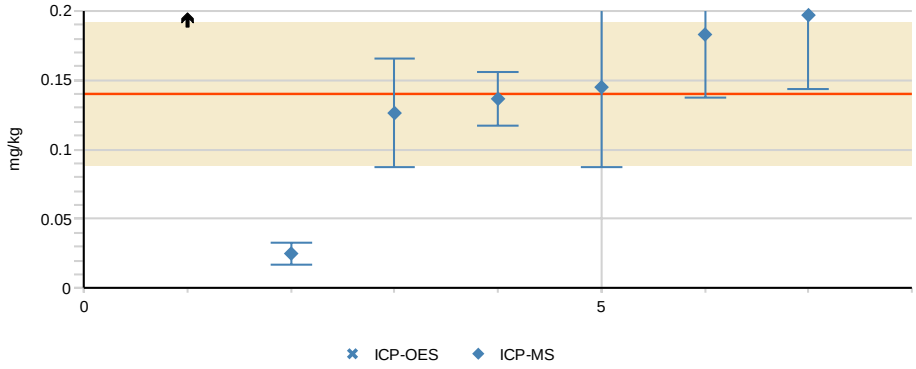
Measurand Ba Sample LT1F2



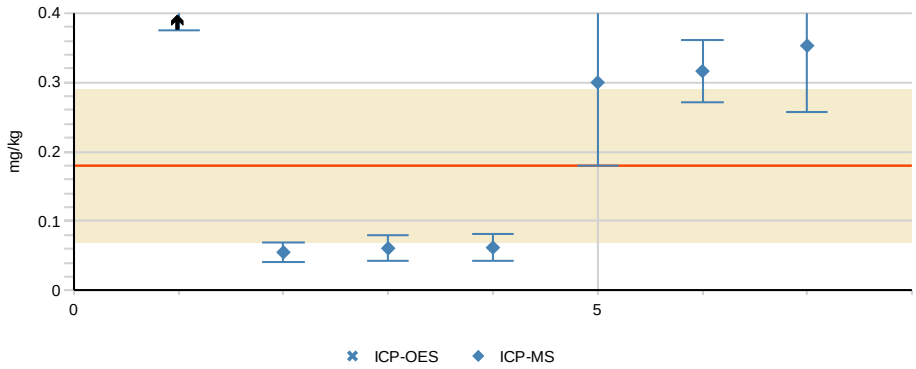
Measurand Ba Sample LT1F3



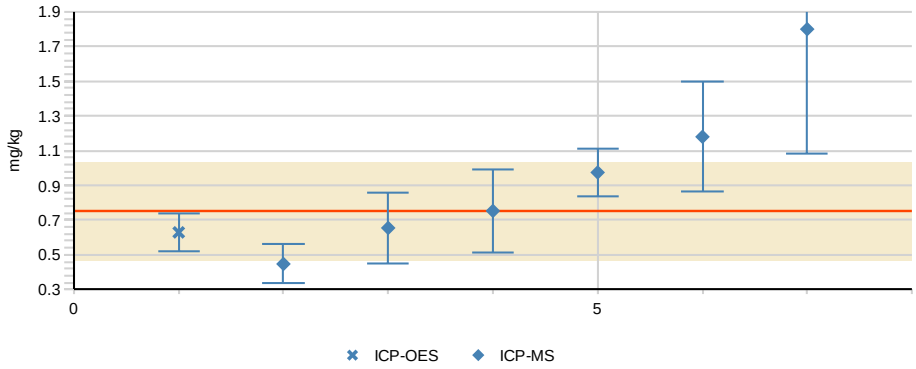
Measurand Ba Sample LT1F4



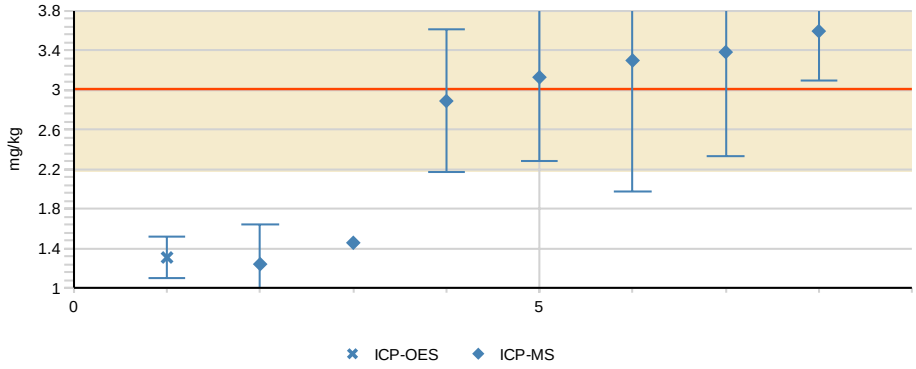
Measurand Ba Sample LT1F5



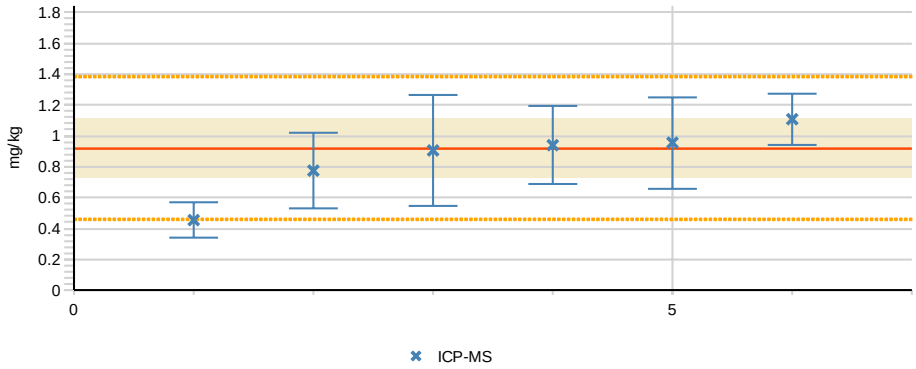
Measurand Ba Sample LT1F6



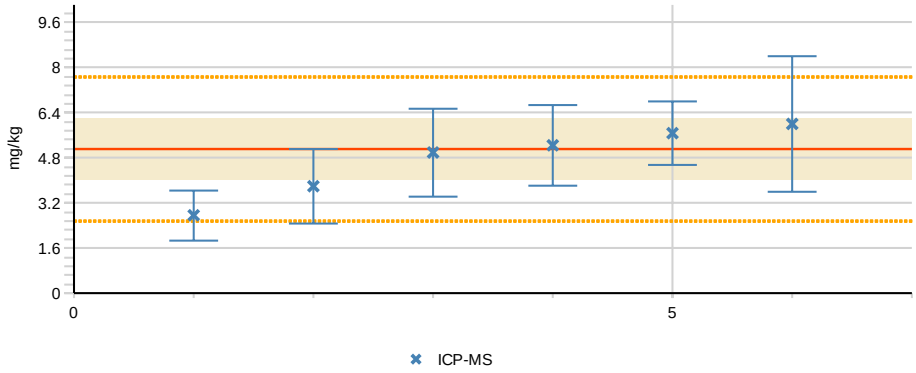
Measurand Ba Sample LT1F7

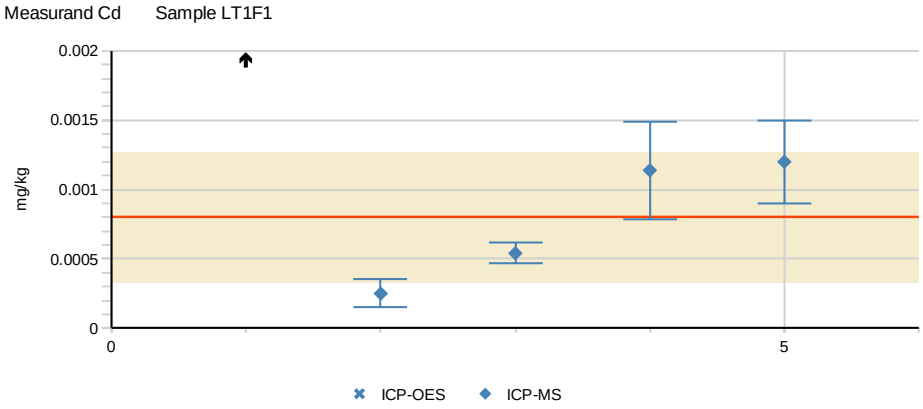


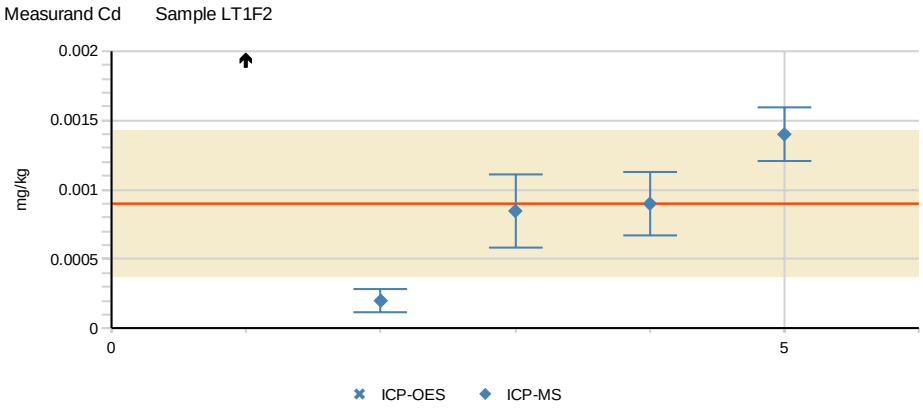
Measurand Ba Sample LT1LS_2

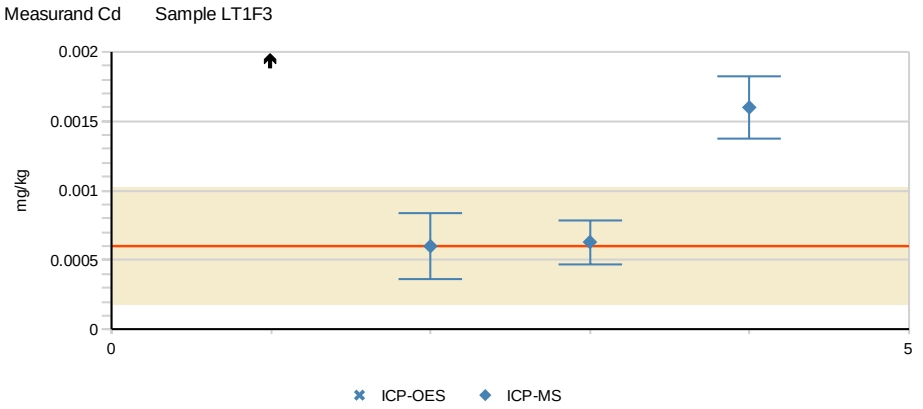


Measurand Ba Sample LT1LS10

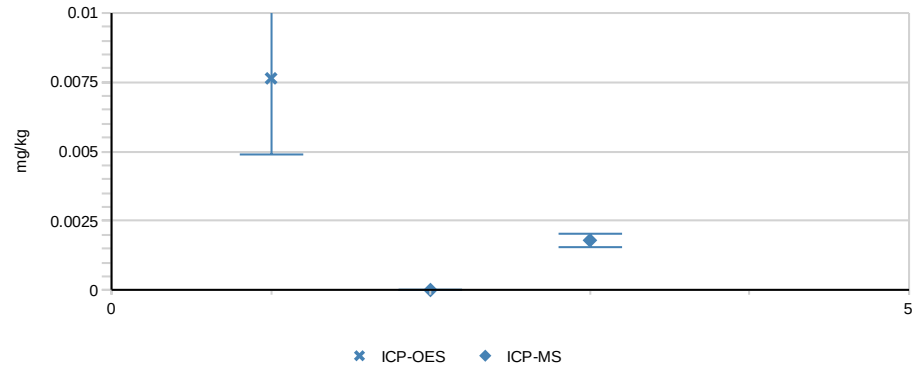



Measurand Cd
Sample LT1F1
0.002
0.0015
0.001
0.0005
0
mg/kg
0
5
ICP-OES
ICP-MS

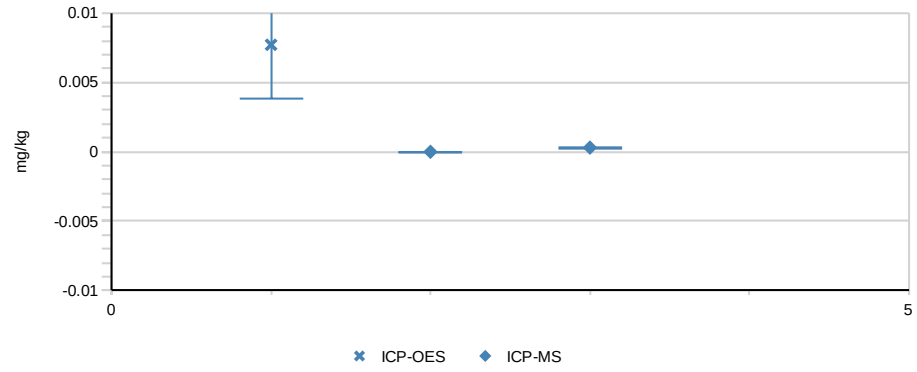

Measurand Cd
Sample LT1F2
0.002
0.0015
0.001
0.0005
0
mg/kg
0
5
ICP-OES
ICP-MS


Measurand Cd
Sample LT1F3
0.002
0.0015
0.001
0.0005
0
mg/kg
0
5
ICP-OES
ICP-MS

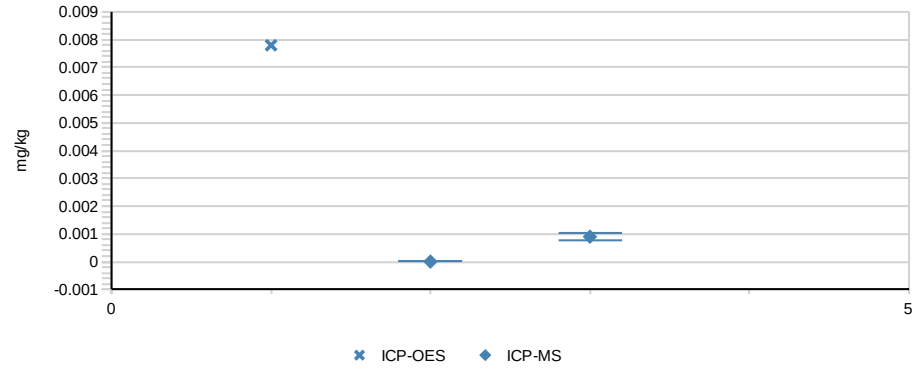
Measurand Cd Sample LT1F4

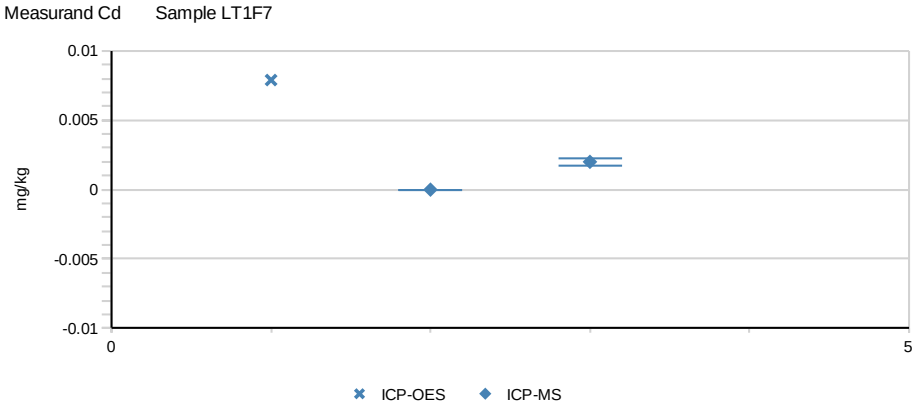


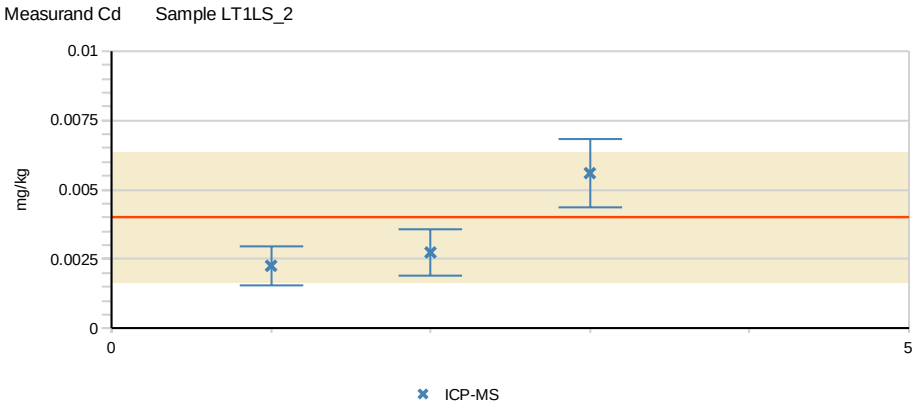
Measurand Cd Sample LT1F5

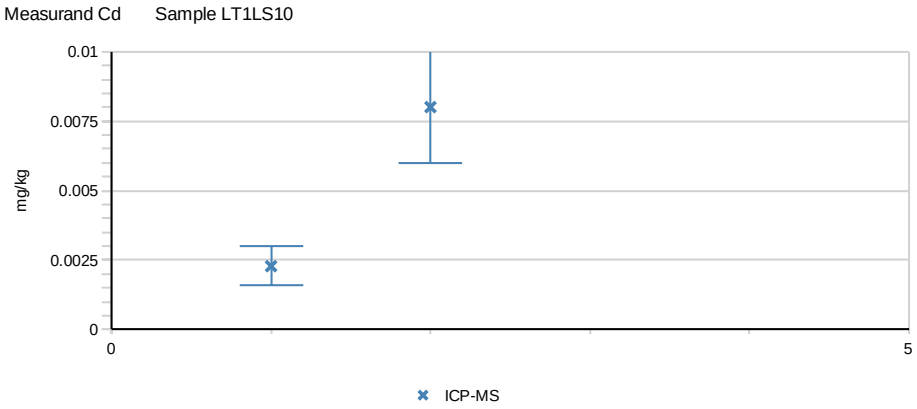


Measurand Cd Sample LT1F6

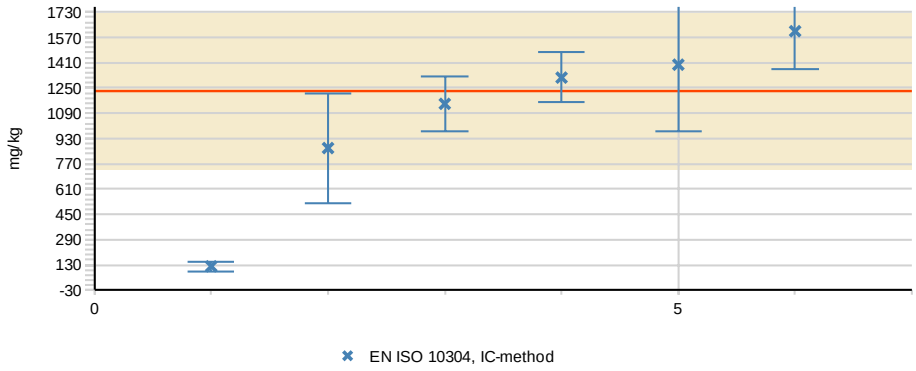



Measurand Cd
Sample LT1F7
0.01
0.005
0
-0.005
-0.01
mg/kg
0
5
ICP-OES
ICP-MS

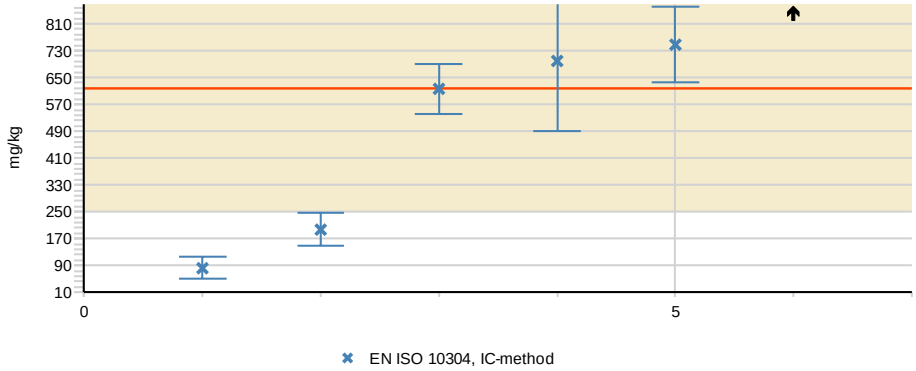

Measurand Cd
Sample LT1LS_2
0.01
0.0075
0.005
0.0025
0
mg/kg
0
5
ICP-MS


Measurand Cd
Sample LT1LS10
0.01
0.0075
0.005
0.0025
0
mg/kg
0
5
ICP-MS

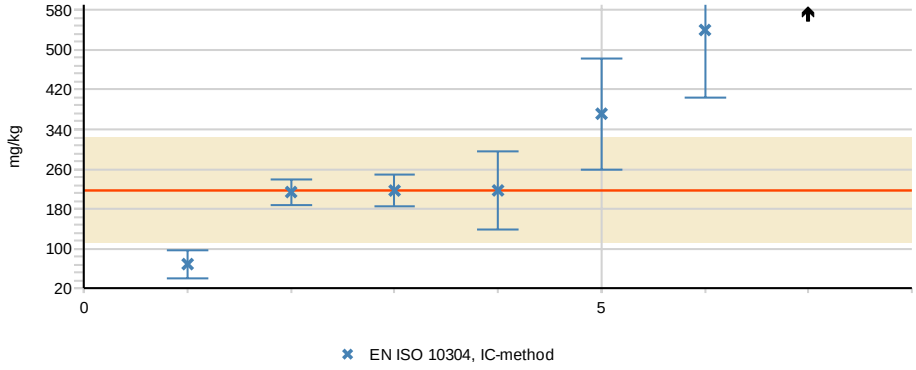
Measurand Cl Sample LT1F1

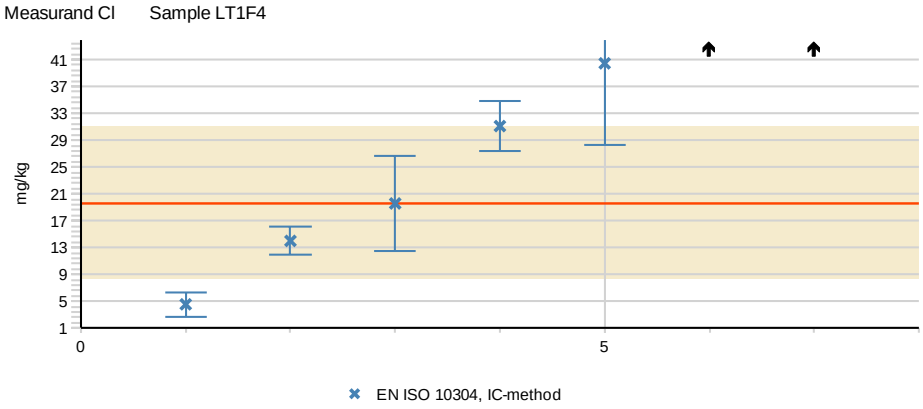


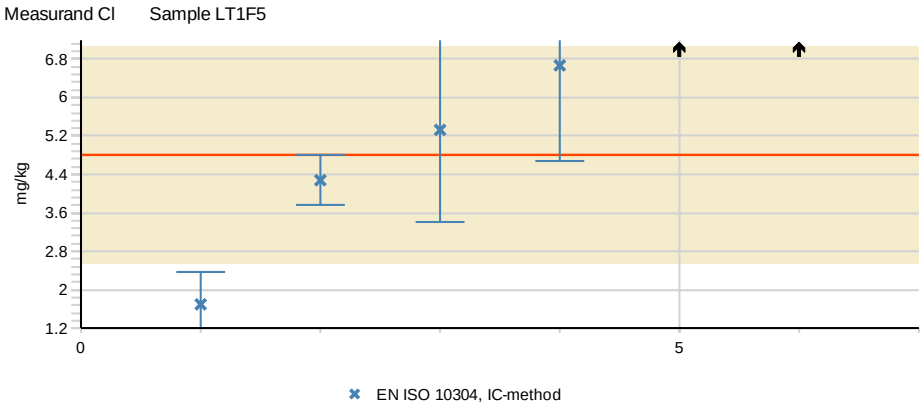
Measurand Cl Sample LT1F2

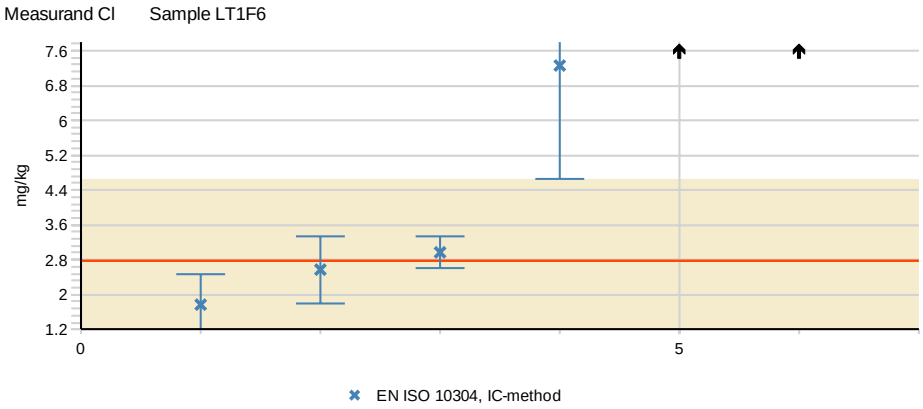


Measurand Cl Sample LT1F3

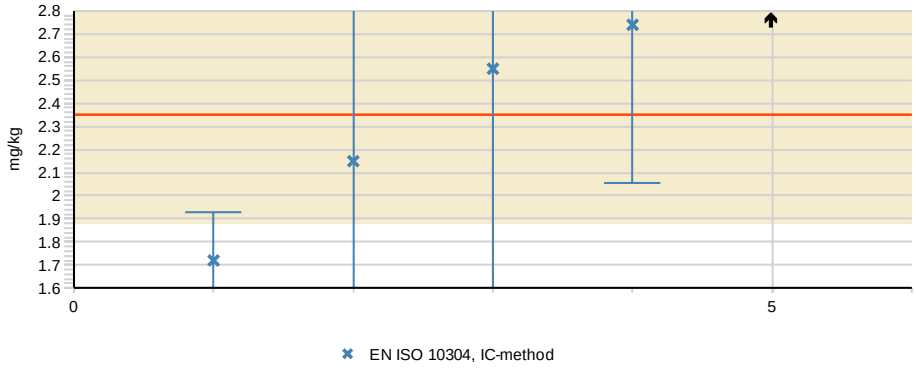



Measurand Cl
Sample LT1F4
mg/kg
41
37
33
29
25
21
17
13
9
5
1
0
5
EN ISO 10304, IC-method

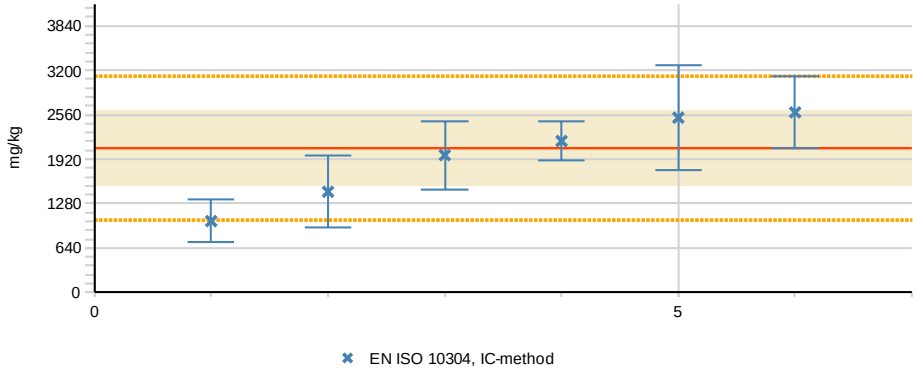

Measurand Cl
Sample LT1F5
mg/kg
6.8
6
5.2
4.4
3.6
2.8
2
1.2
0
5
EN ISO 10304, IC-method


Measurand Cl
Sample LT1F6
mg/kg
7.6
6.8
6
5.2
4.4
3.6
2.8
2
1.2
0
5
EN ISO 10304, IC-method

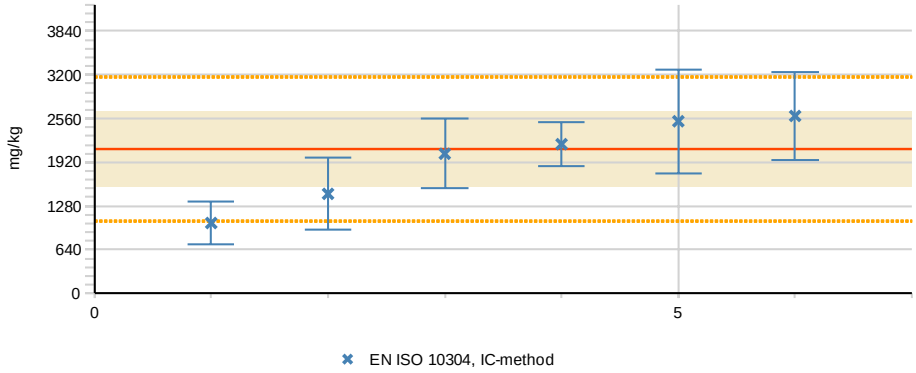
Measurand Cl Sample LT1F7



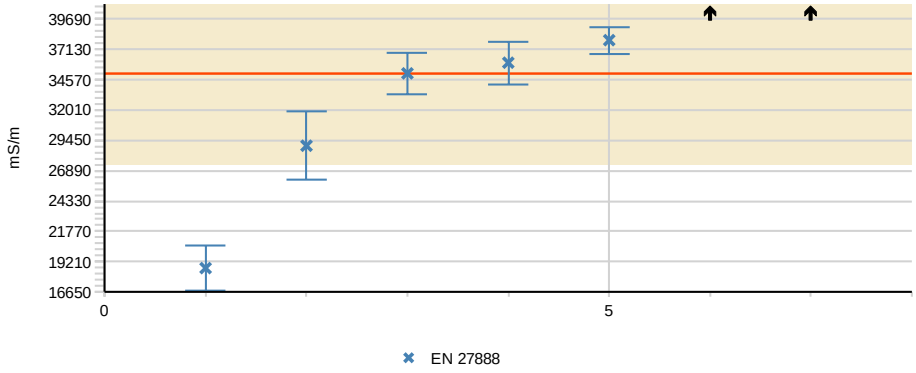
Measurand Cl Sample LT1LS_2



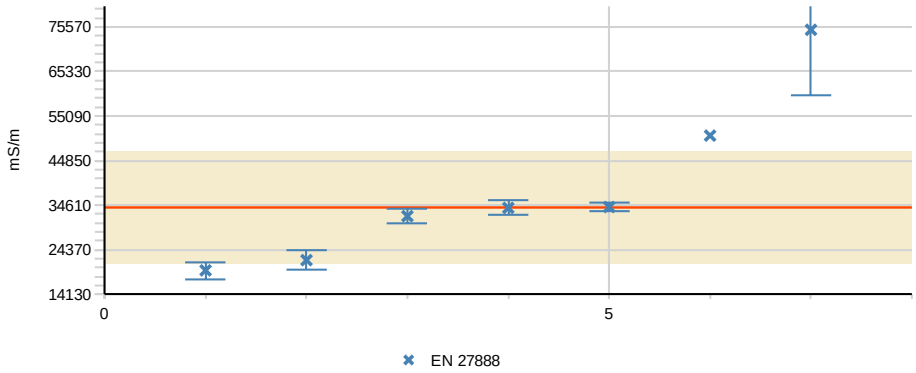
Measurand Cl Sample LT1LS10



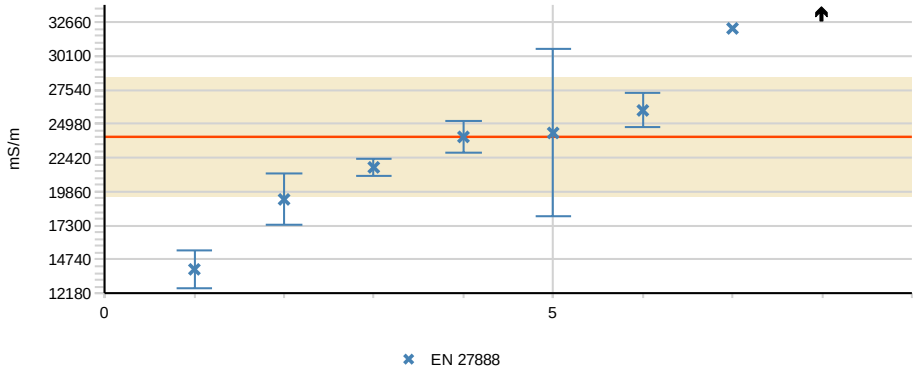
Measurand Conductivity 25 Sample LT1F1



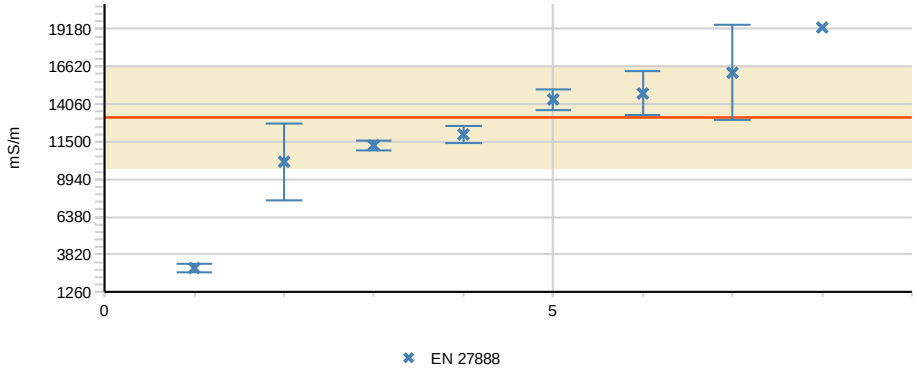
Measurand Conductivity 25 Sample LT1F2



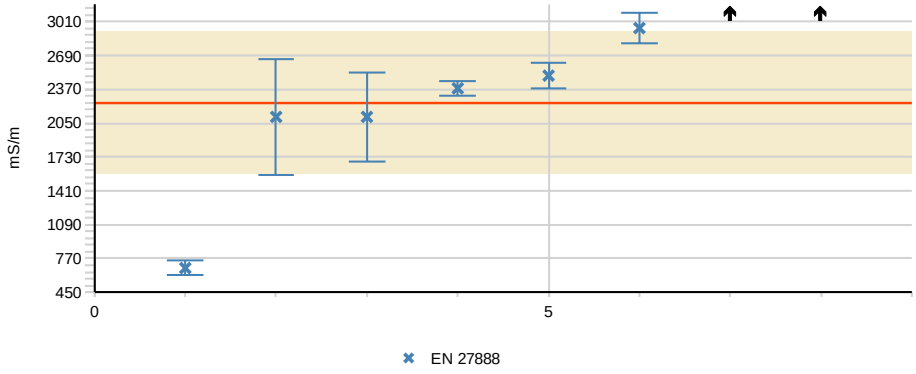
Measurand Conductivity 25 Sample LT1F3



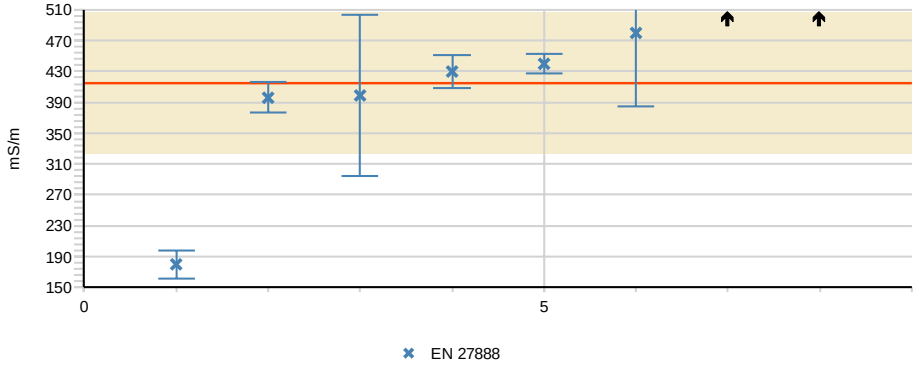
Measurand Conductivity 25 Sample LT1F4



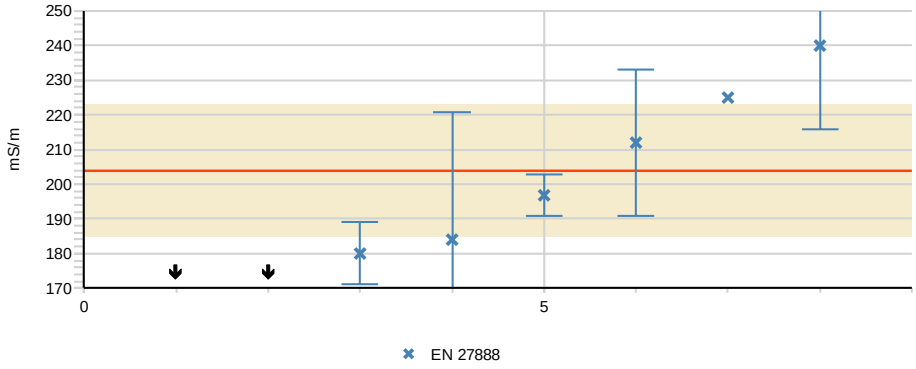
Measurand Conductivity 25 Sample LT1F5



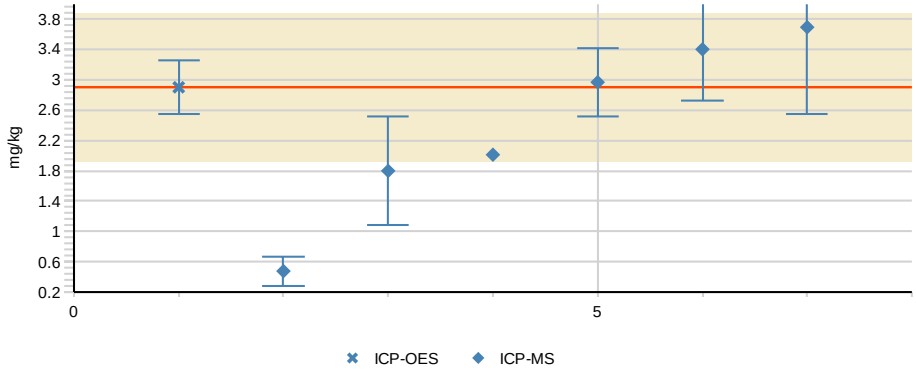
Measurand Conductivity 25 Sample LT1F6



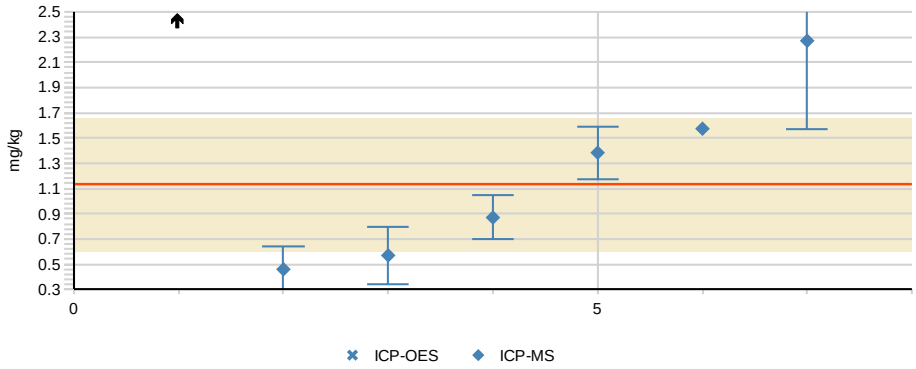
Measurand Conductivity 25 Sample LT1F7



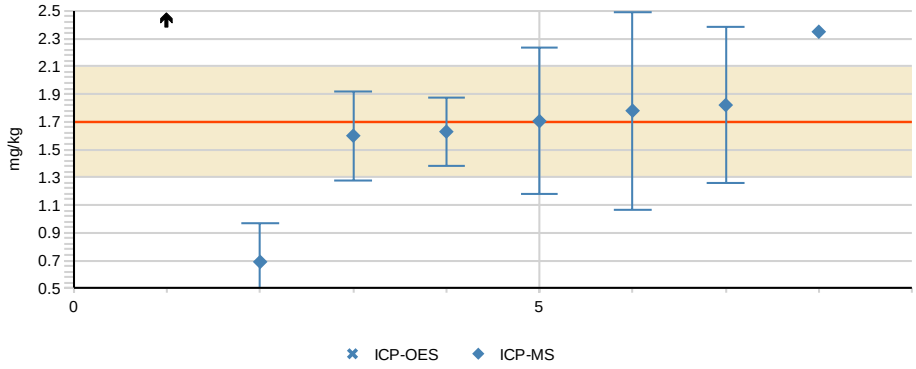
Measurand Cr Sample LT1F1



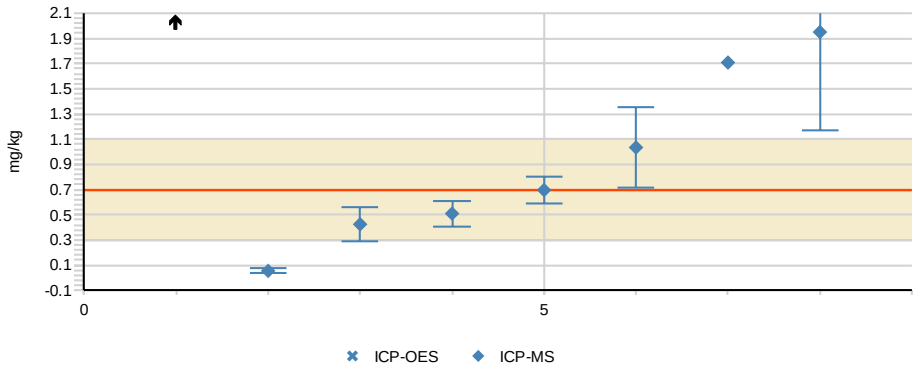
Measurand Cr Sample LT1F2



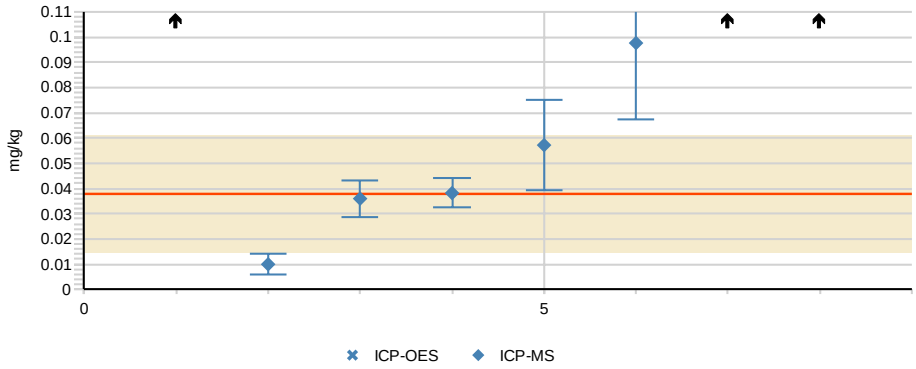
Measurand Cr Sample LT1F3



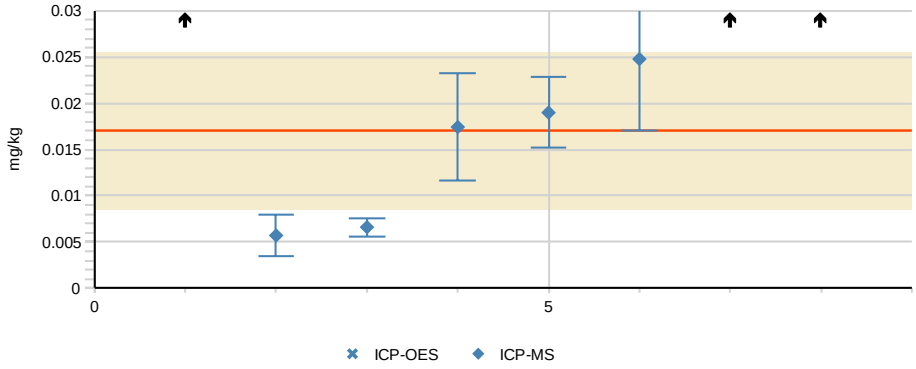
Measurand Cr Sample LT1F4



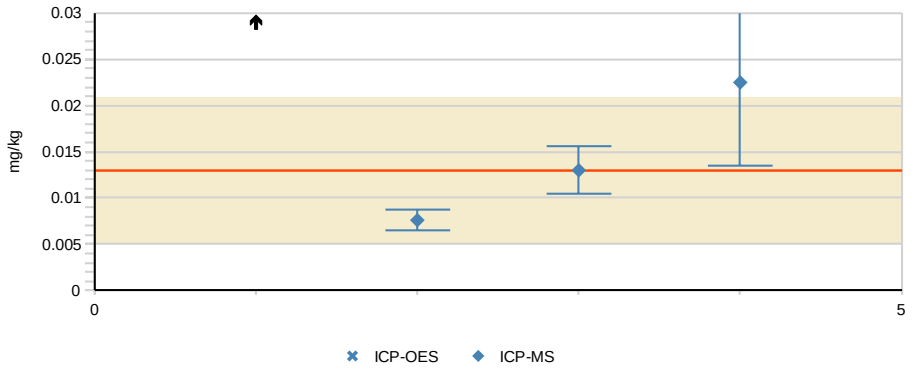
Measurand Cr Sample LT1F5



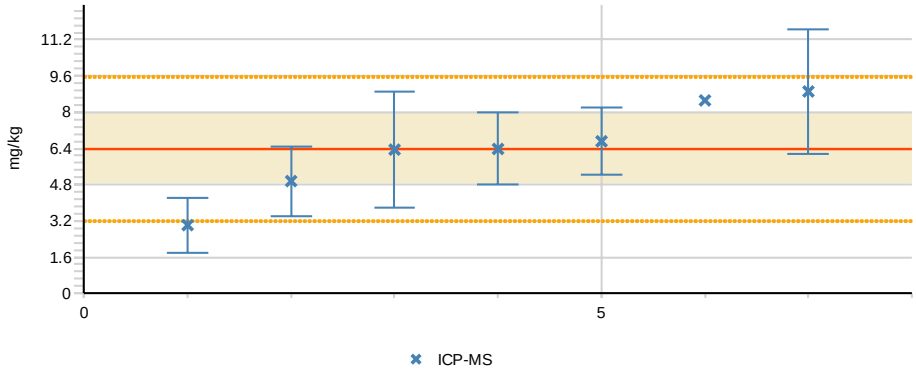
Measurand Cr Sample LT1F6



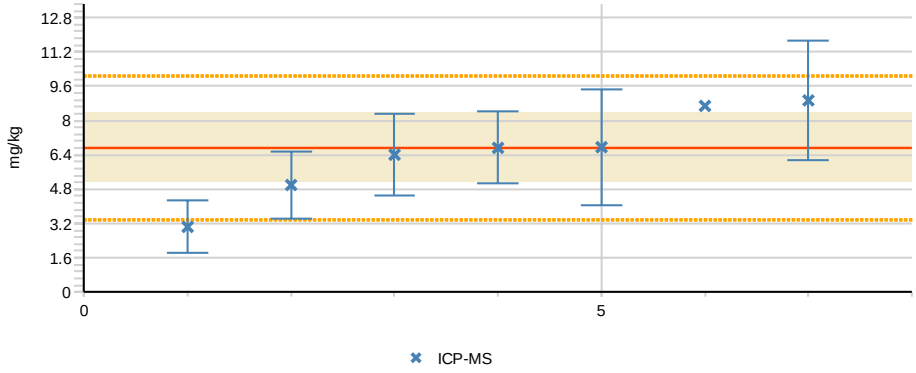
Measurand Cr Sample LT1F7



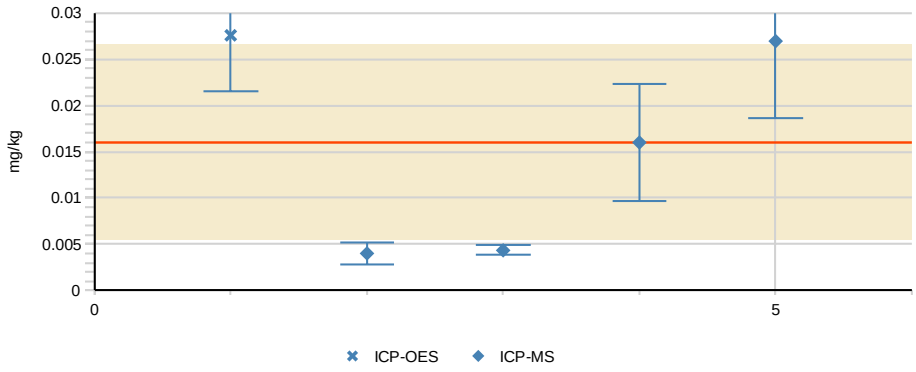
Measurand Cr Sample LT1LS_2



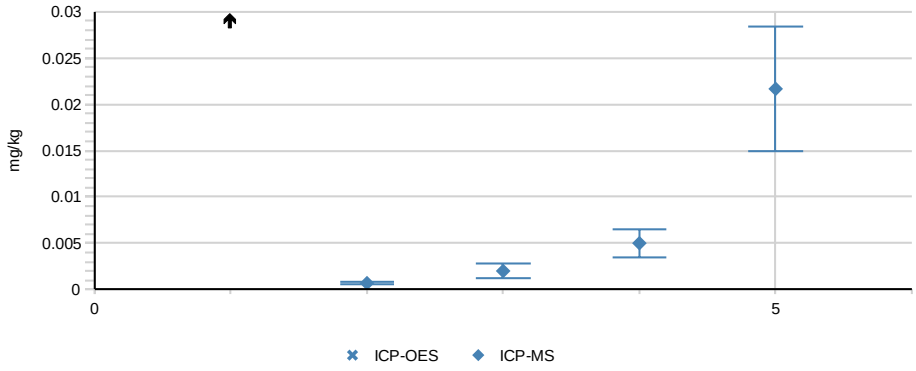
Measurand Cr Sample LT1LS10

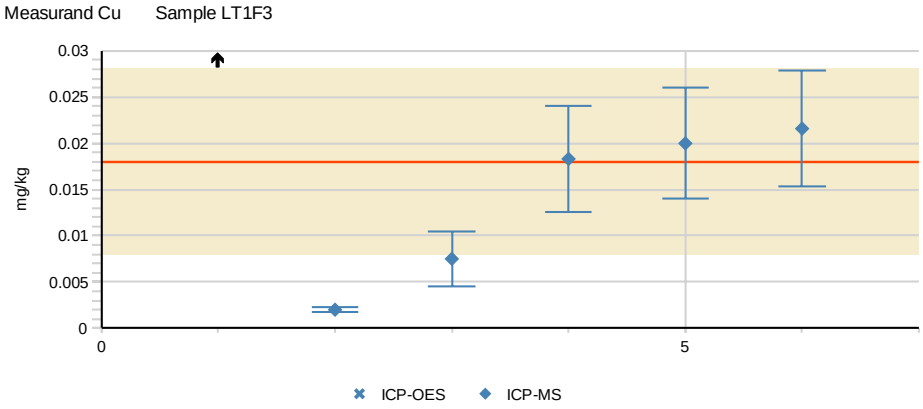


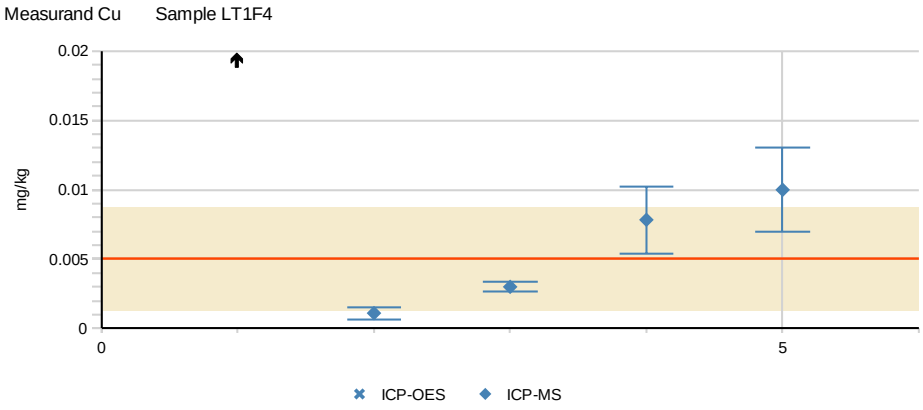
Measurand Cu Sample LT1F1

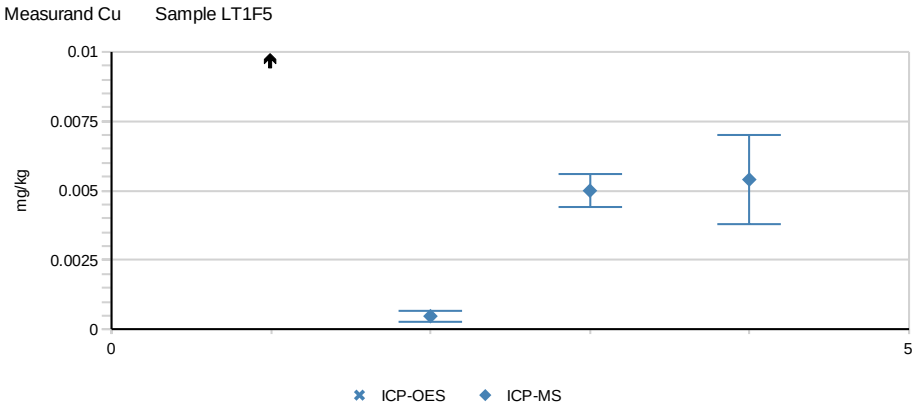


Measurand Cu Sample LT1F2

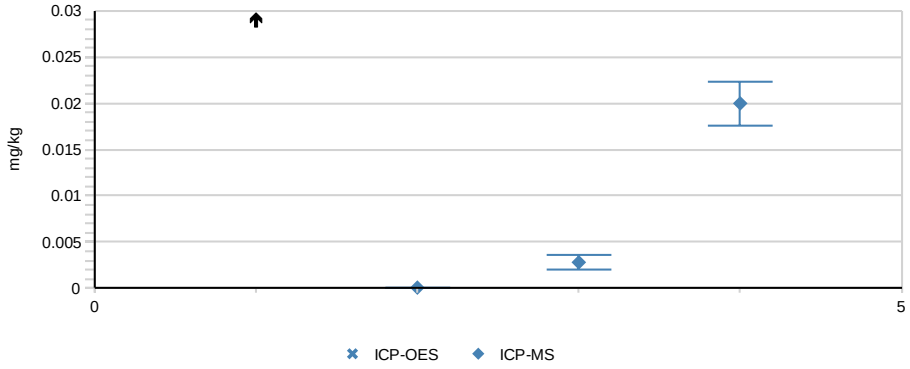



Measurand Cu
Sample LT1F3
0.03
0.025
0.02
0.015
0.01
0.005
0
mg/kg
0
5
ICP-OES
ICP-MS

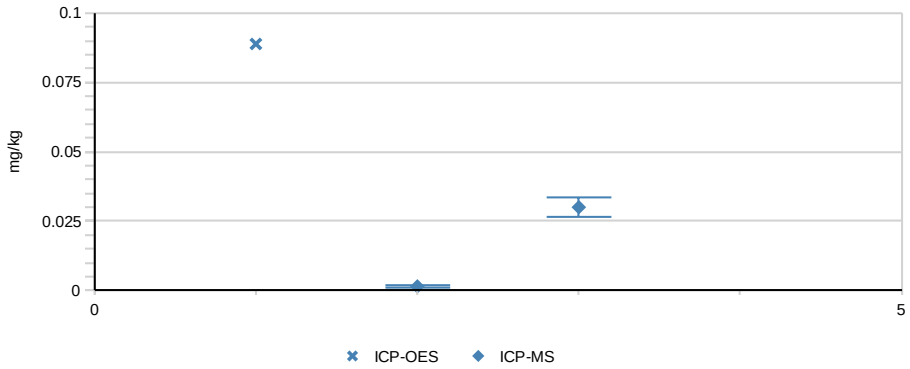

Measurand Cu
Sample LT1F4
0.02
0.015
0.01
0.005
0
mg/kg
0
5
ICP-OES
ICP-MS


Measurand Cu
Sample LT1F5
0.01
0.0075
0.005
0.0025
0
mg/kg
0
5
ICP-OES
ICP-MS

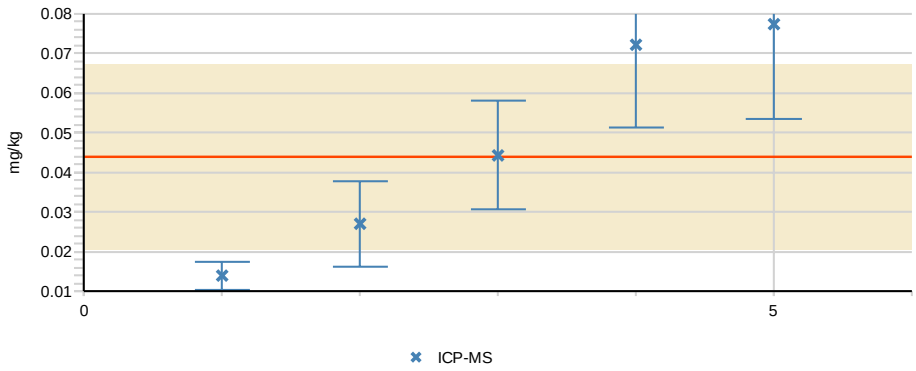
Measurand Cu Sample LT1F6



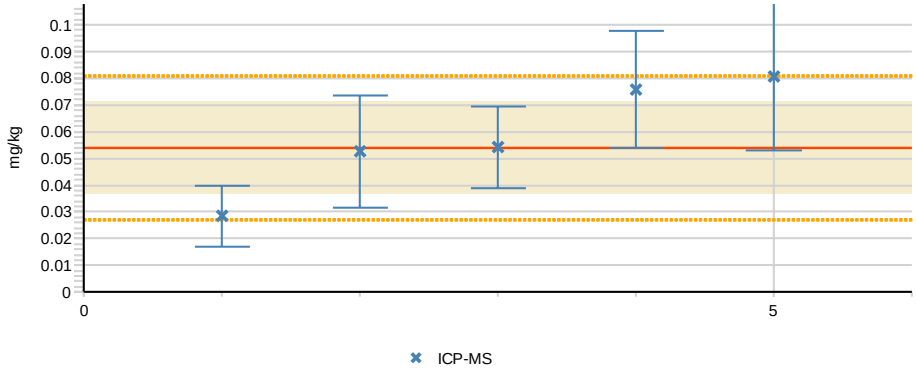
Measurand Cu Sample LT1F7



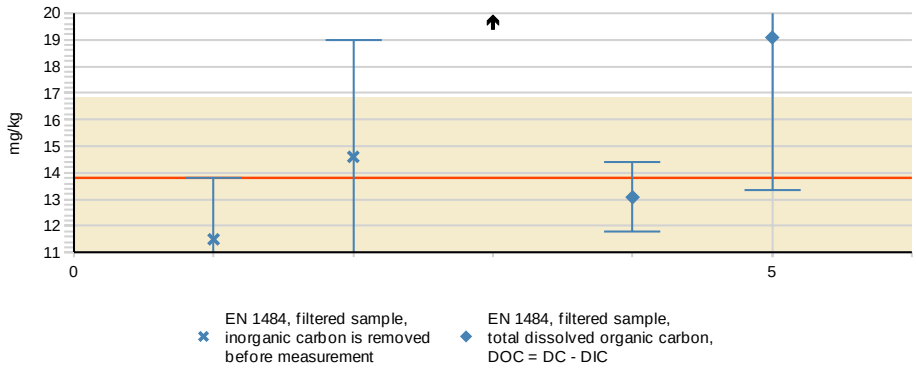
Measurand Cu Sample LT1LS_2



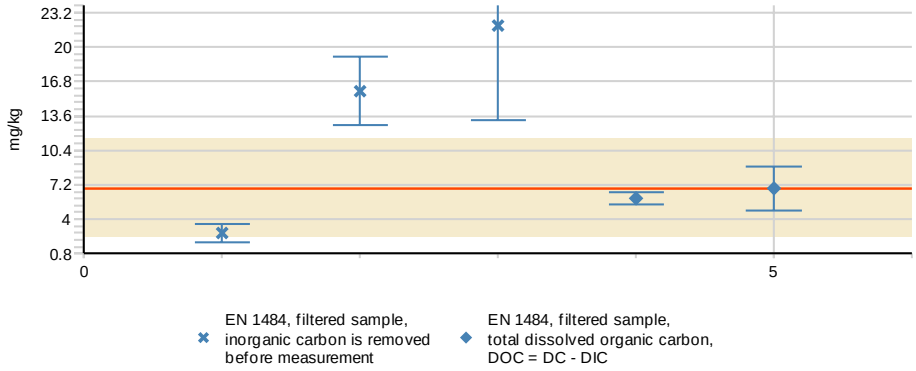
Measurand Cu Sample LT1LS10



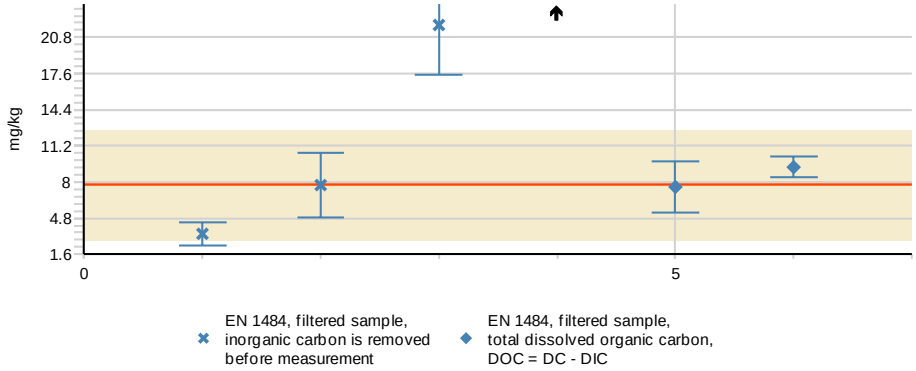
Measurand DOC Sample LT1F1



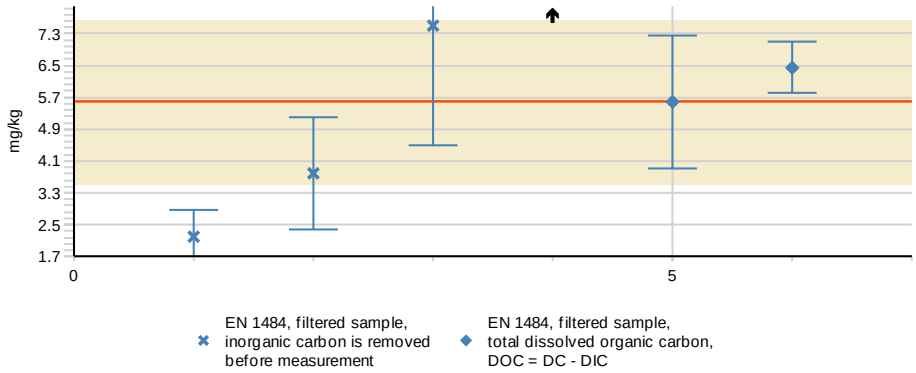
Measurand DOC Sample LT1F2



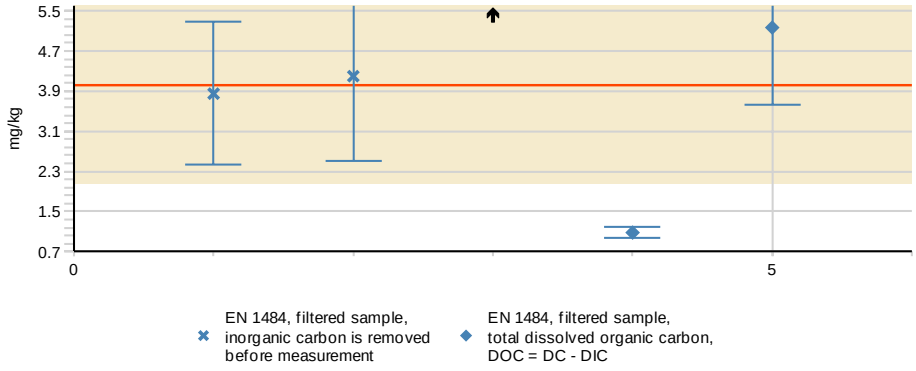
Measurand DOC Sample LT1F3



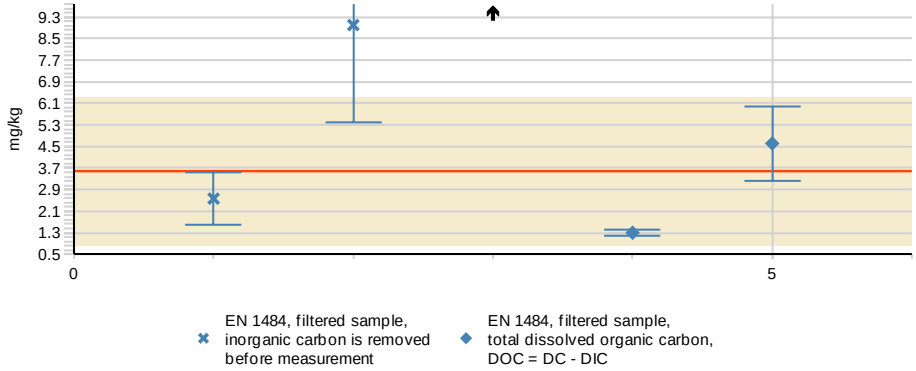
Measurand DOC Sample LT1F4



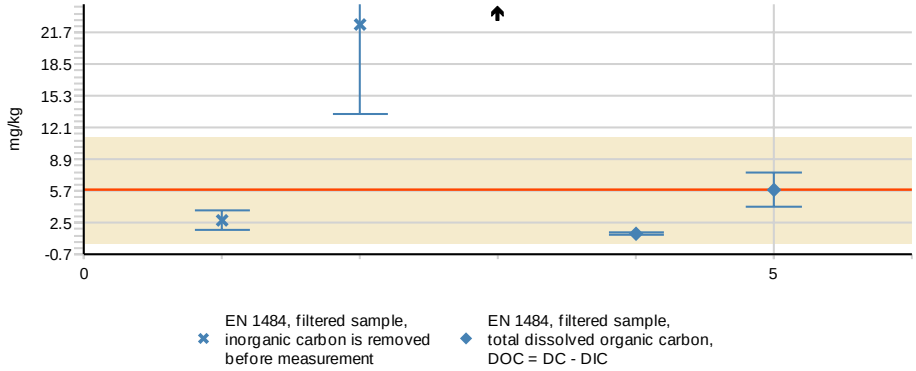
Measurand DOC Sample LT1F5



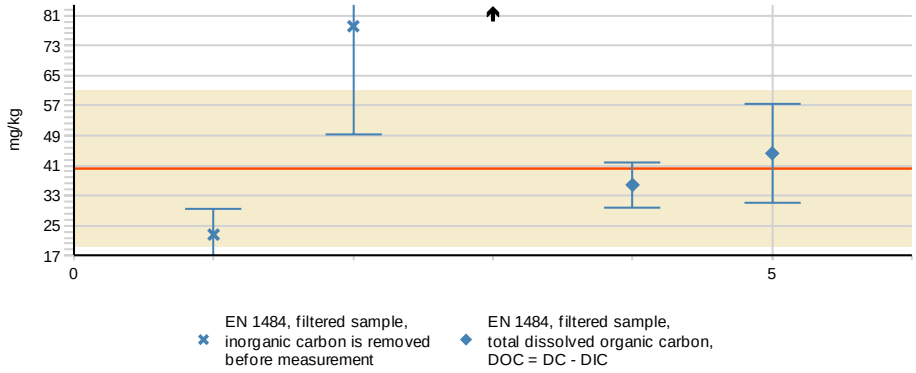
Measurand DOC Sample LT1F6



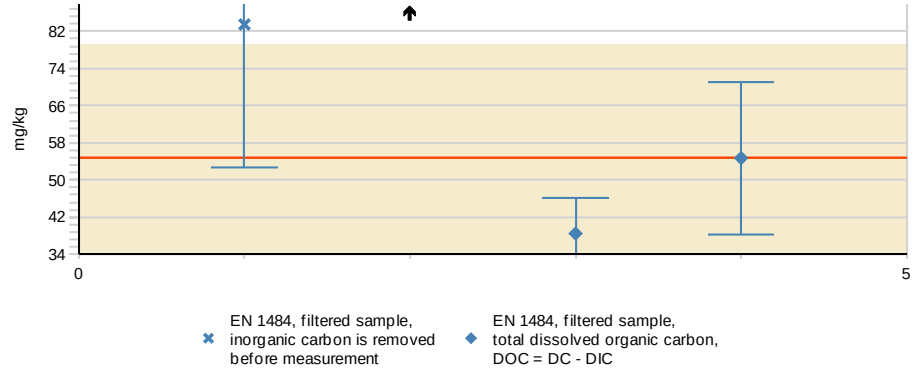
Measurand DOC Sample LT1F7



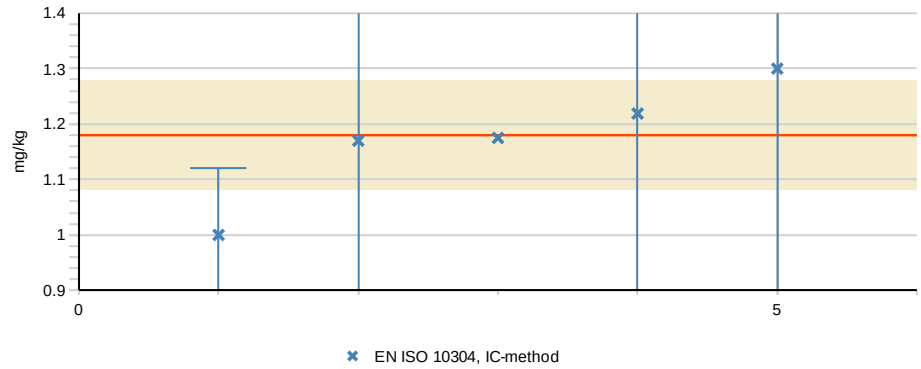
Measurand DOC Sample LT1LS_2



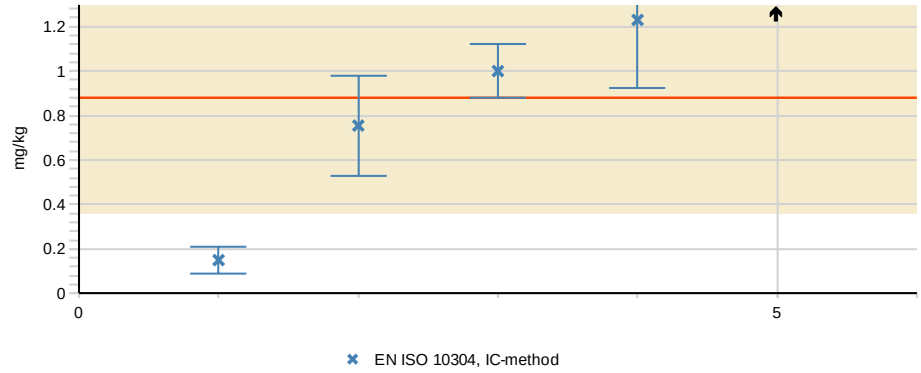
Measurand DOC Sample LT1LS10



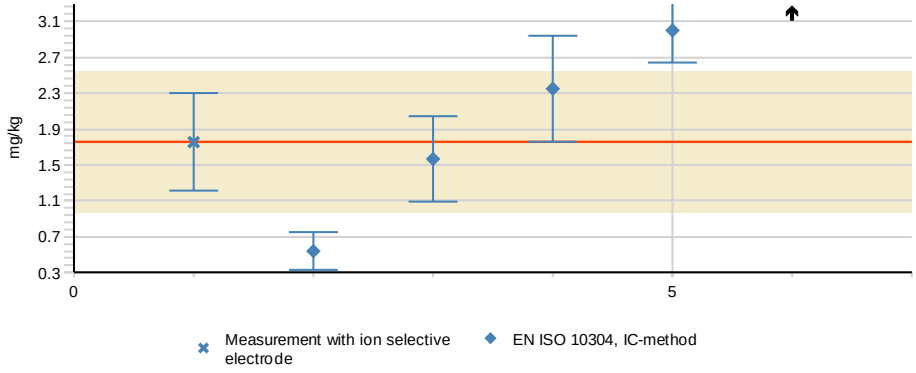
Measurand F Sample LT1F1



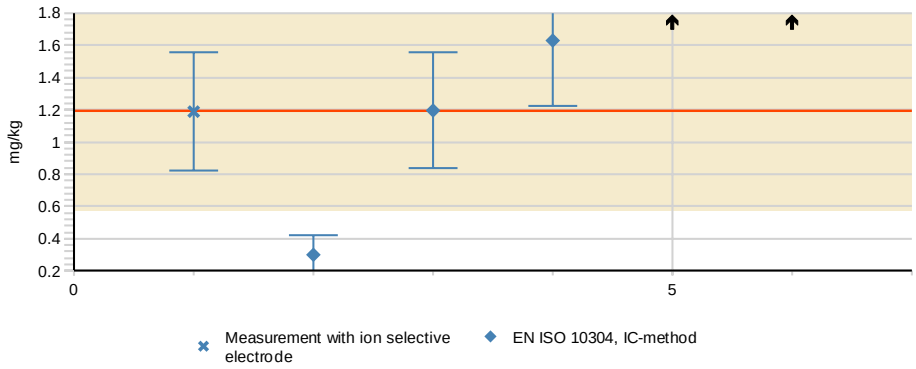
Measurand F Sample LT1F2



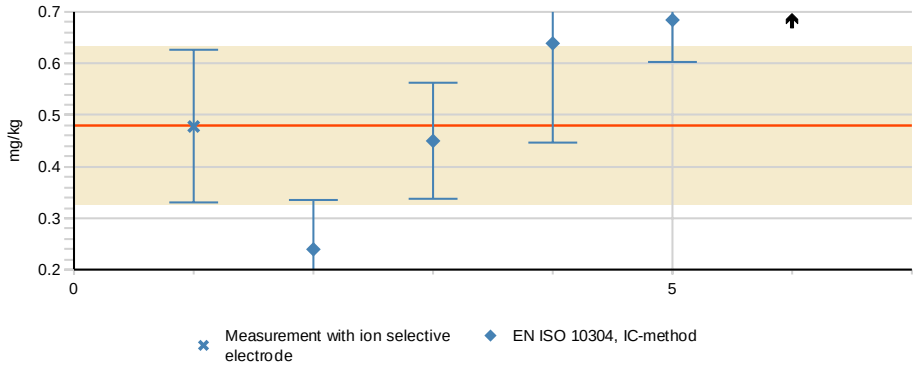
Measurand F Sample LT1F3



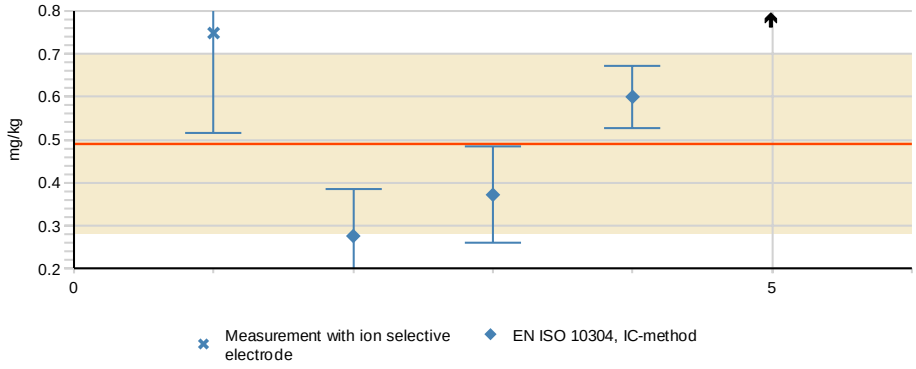
Measurand F Sample LT1F4



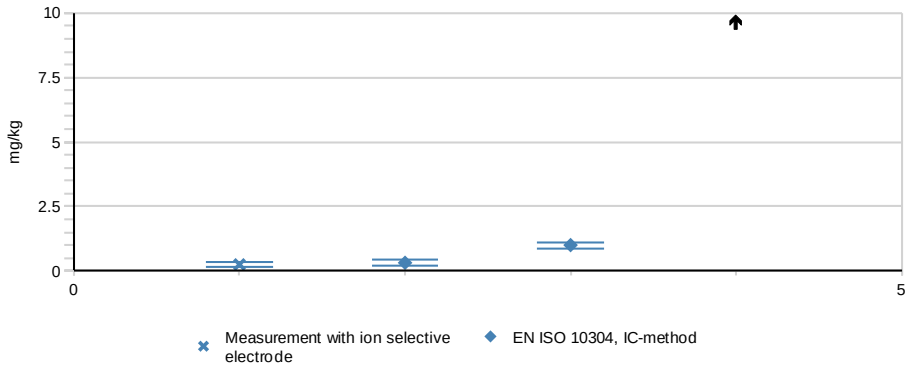
Measurand F Sample LT1F5



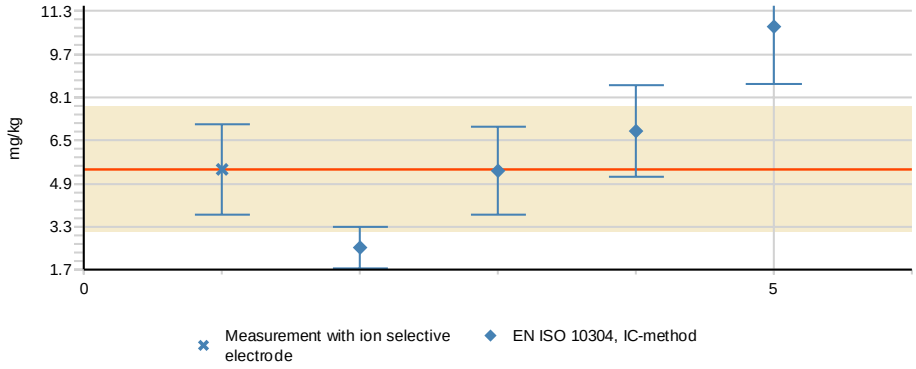
Measurand F Sample LT1F6



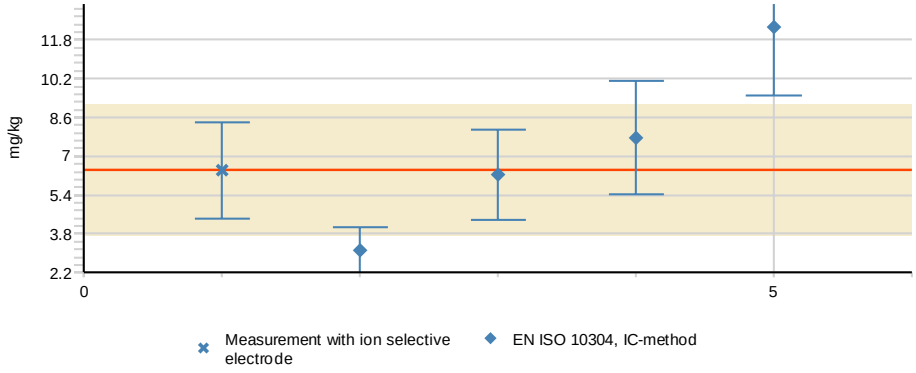
Measurand F Sample LT1F7



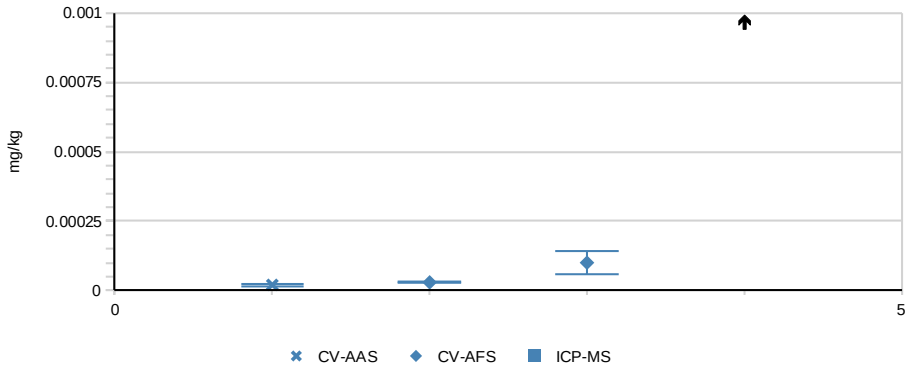
Measurand F Sample LT1LS_2



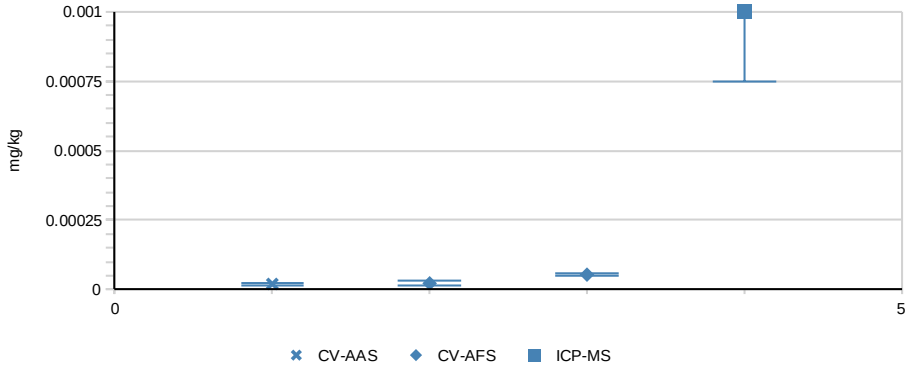
Measurand F Sample LT1LS10



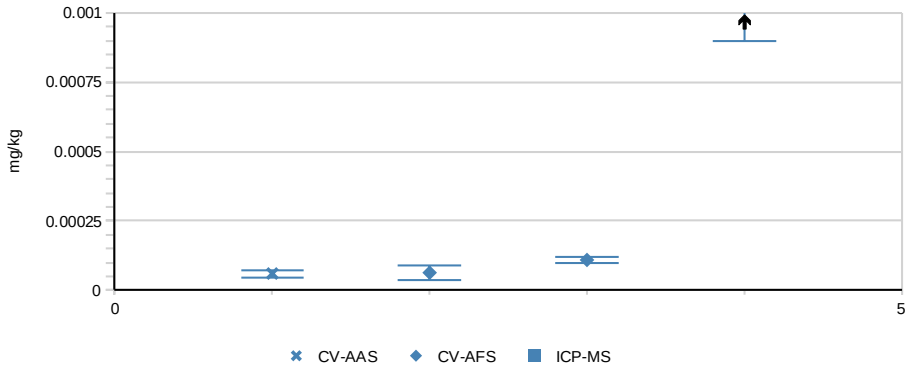
Measurand Hg Sample LT1F1



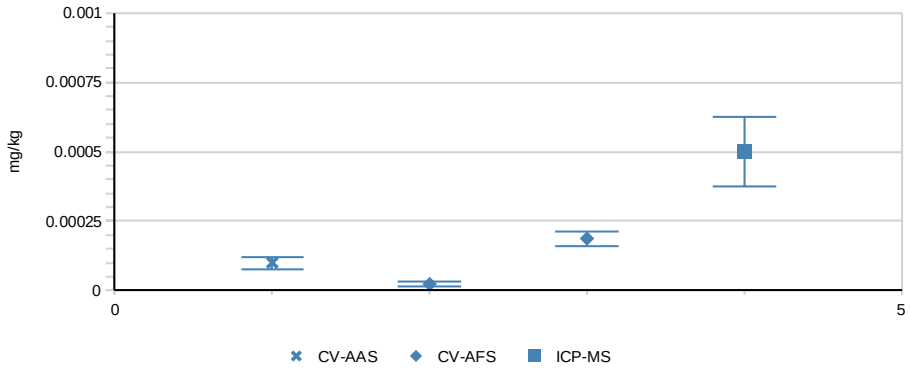
Measurand Hg Sample LT1F2



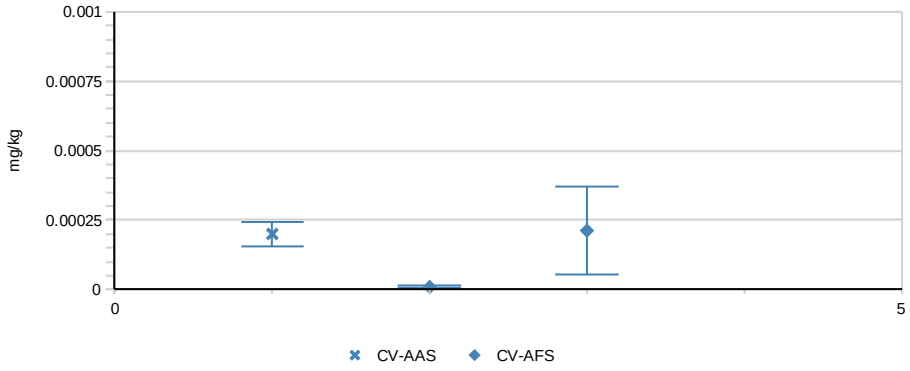
Measurand Hg Sample LT1F3



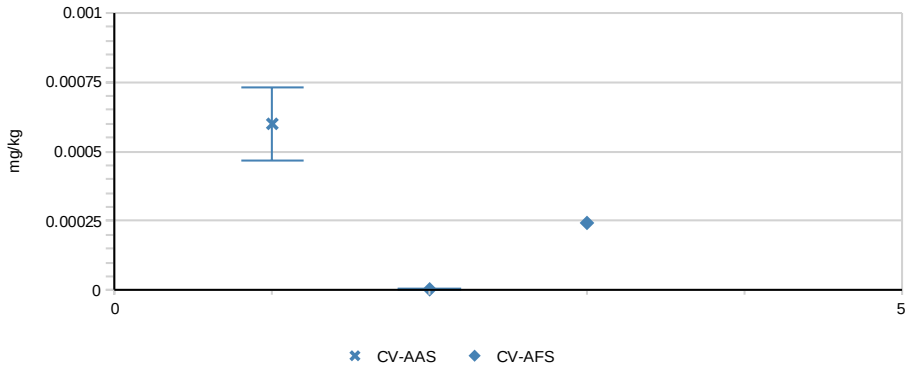
Measurand Hg Sample LT1F4



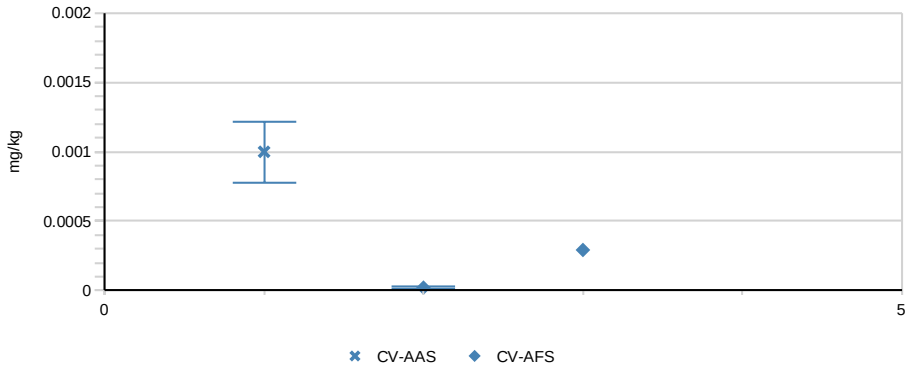
Measurand Hg Sample LT1F5



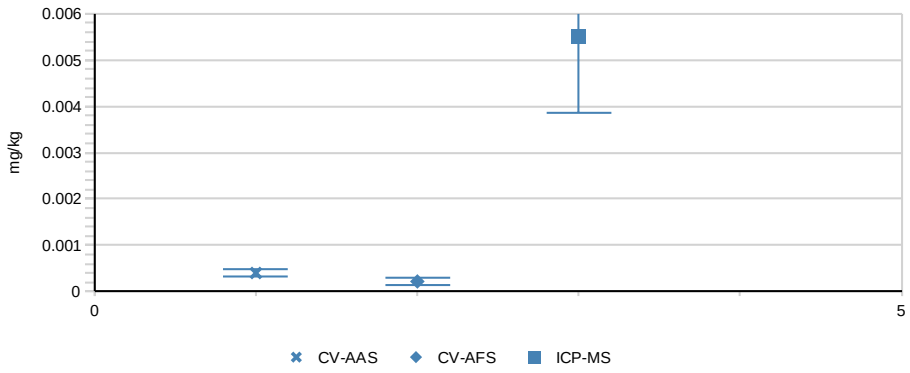
Measurand Hg Sample LT1F6



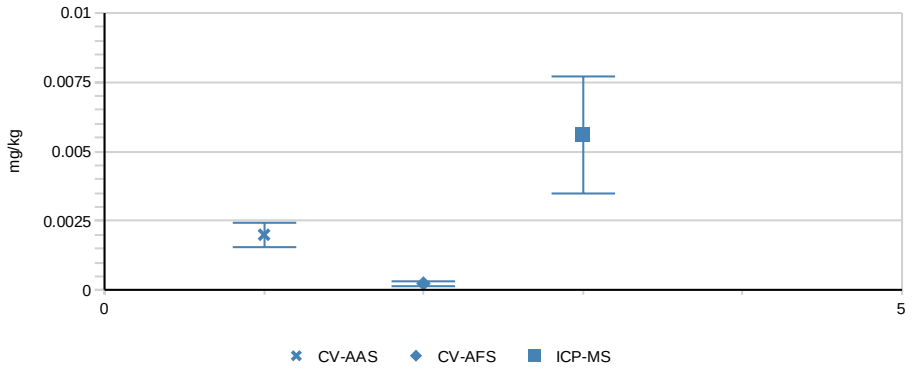
Measurand Hg Sample LT1F7



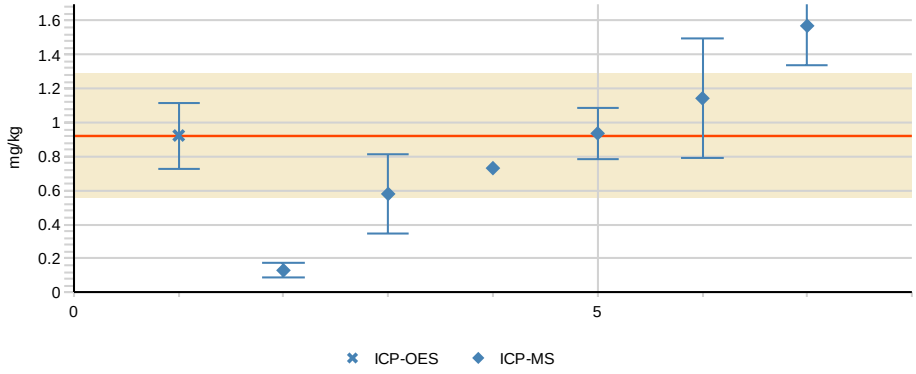
Measurand Hg Sample LT1LS_2



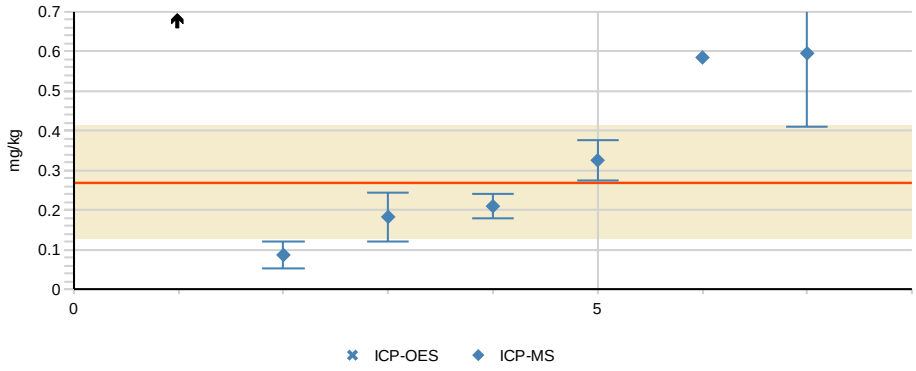
Measurand Hg Sample LT1LS10



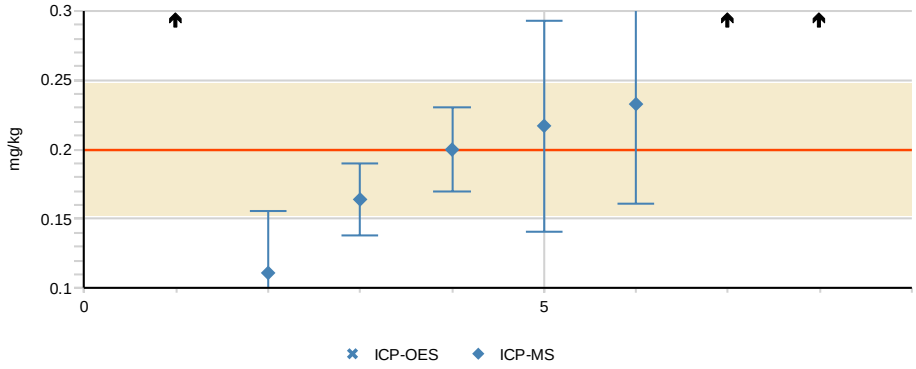
Measurand Mo Sample LT1F1



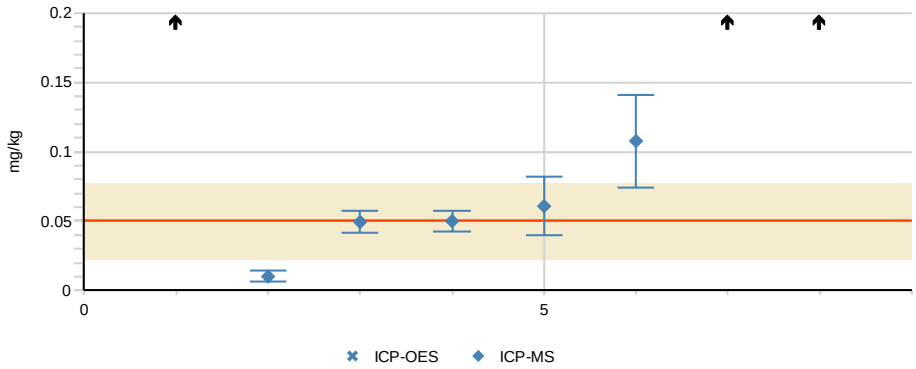
Measurand Mo Sample LT1F2



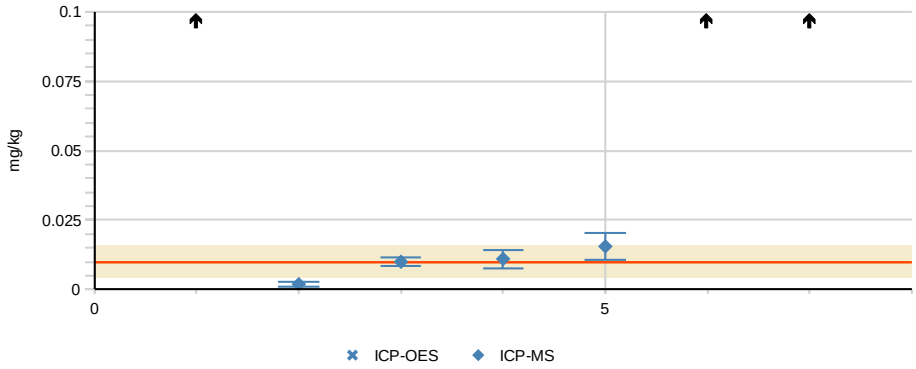
Measurand Mo Sample LT1F3



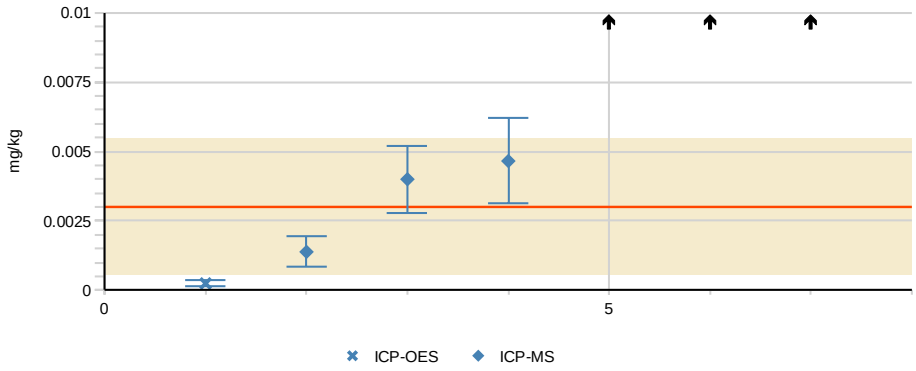
Measurand Mo Sample LT1F4



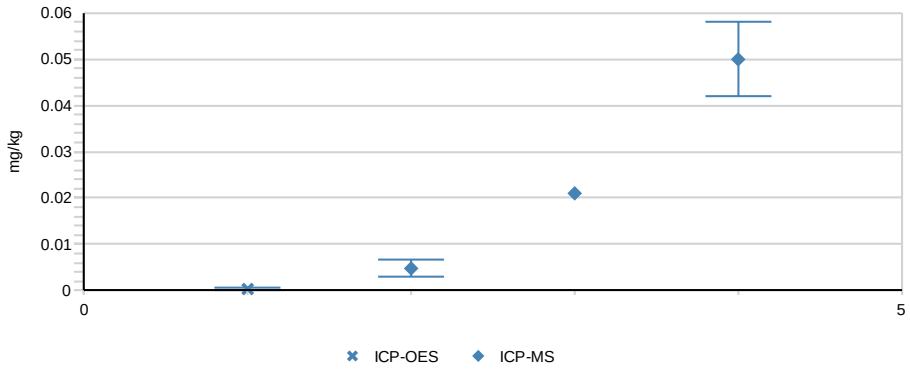
Measurand Mo Sample LT1F5



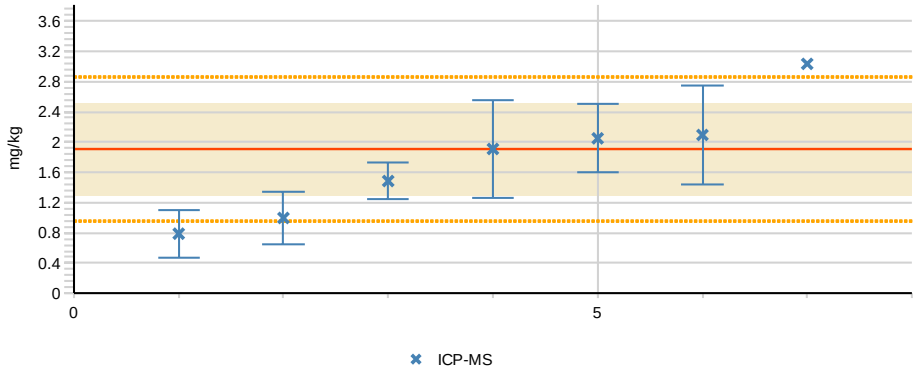
Measurand Mo Sample LT1F6



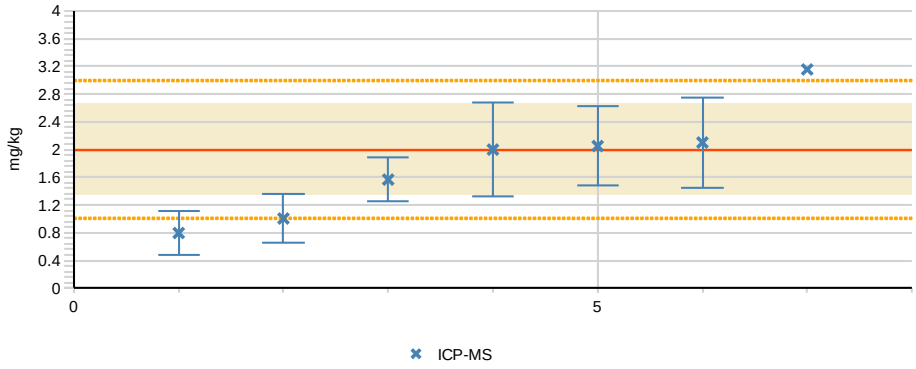
Measurand Mo Sample LT1F7



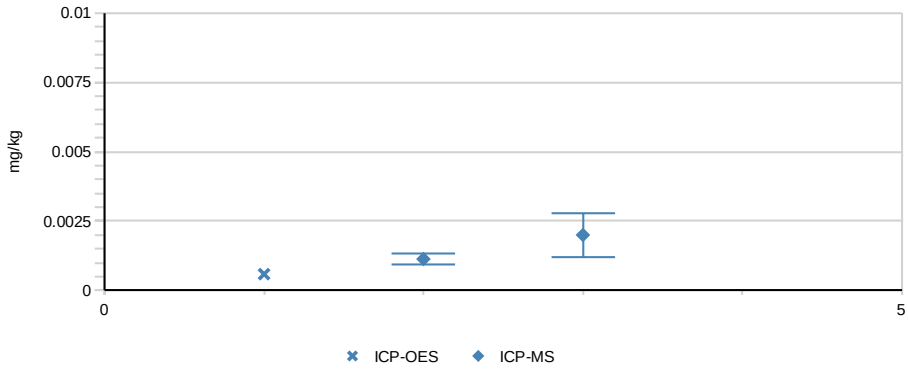
Measurand Mo Sample LT1LS_2



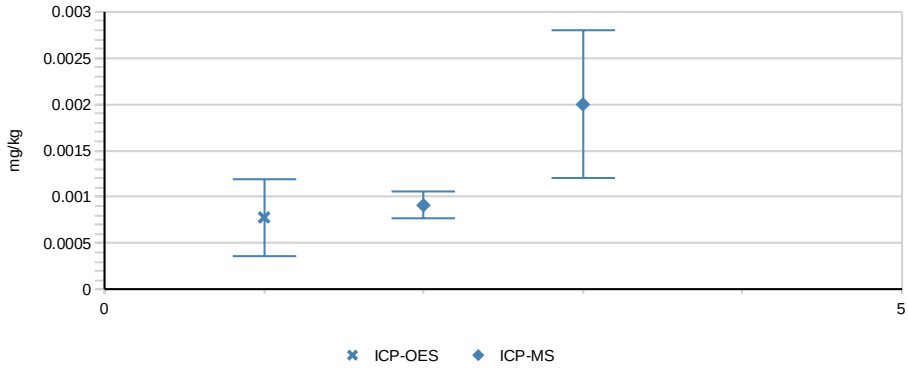
Measurand Mo Sample LT1LS10



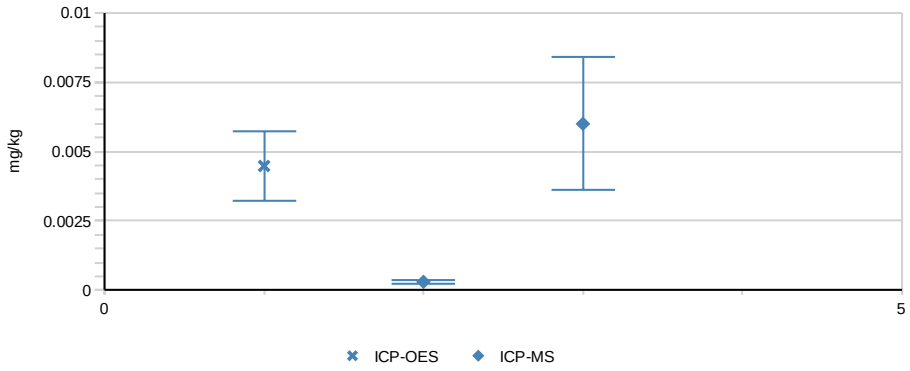
Measurand Ni Sample LT1F1



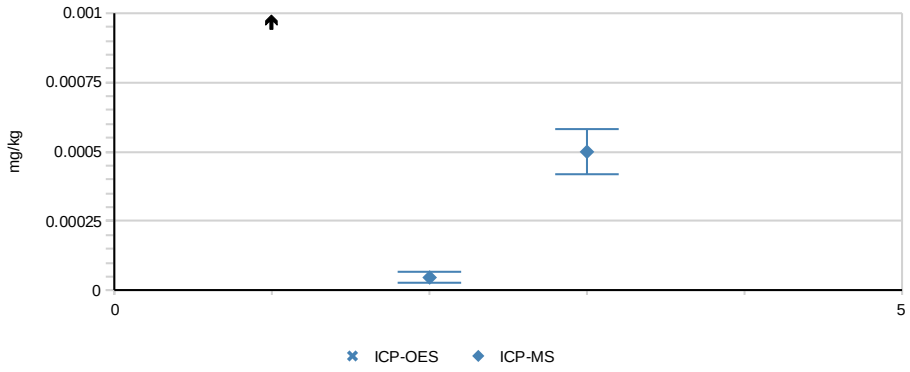
Measurand Ni Sample LT1F2



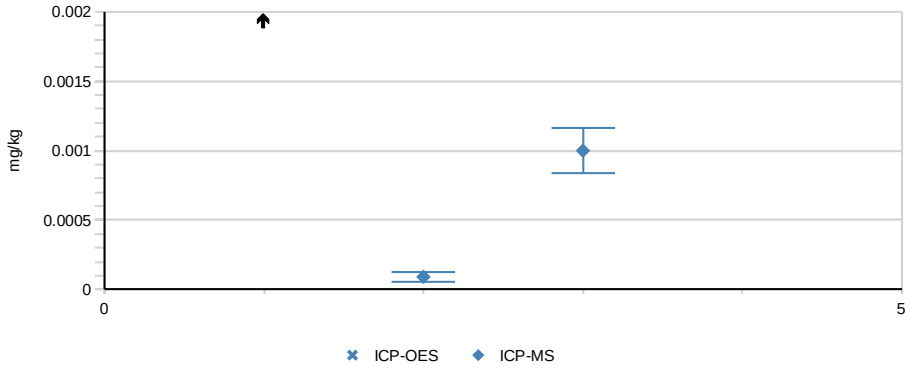
Measurand Ni Sample LT1F3

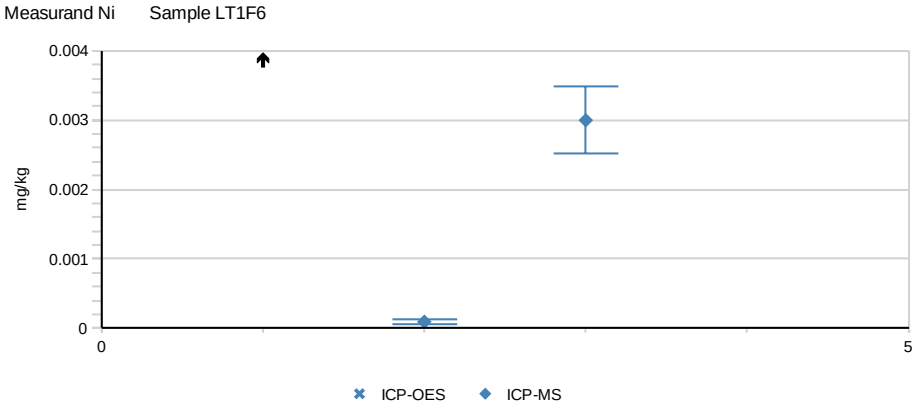


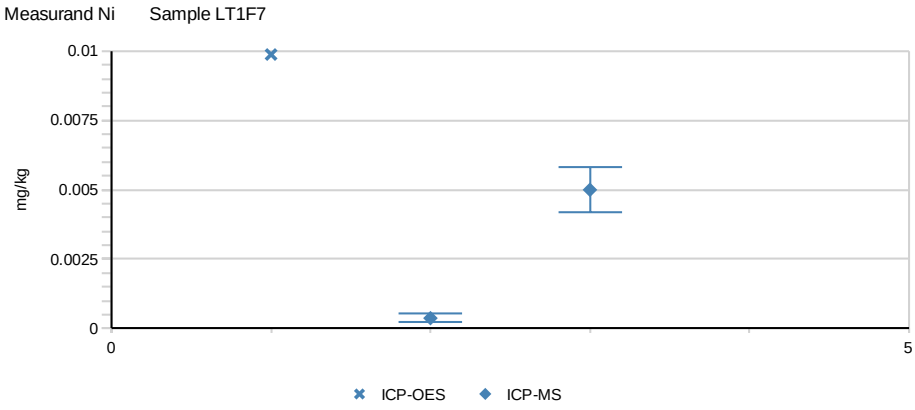
Measurand Ni Sample LT1F4

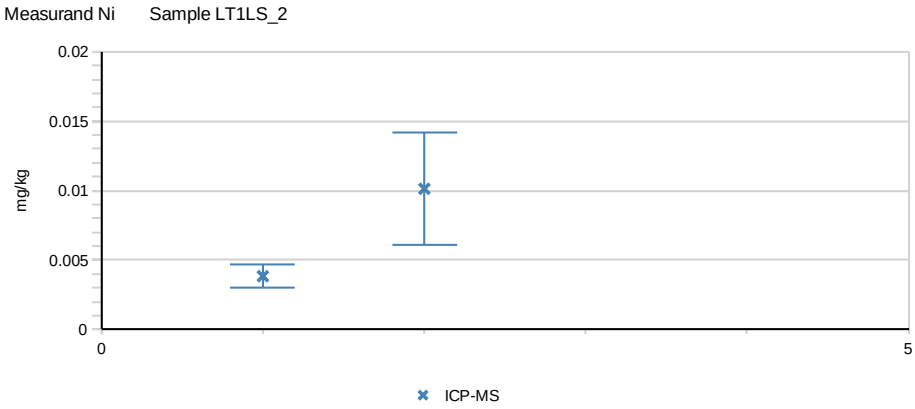


Measurand Ni Sample LT1F5

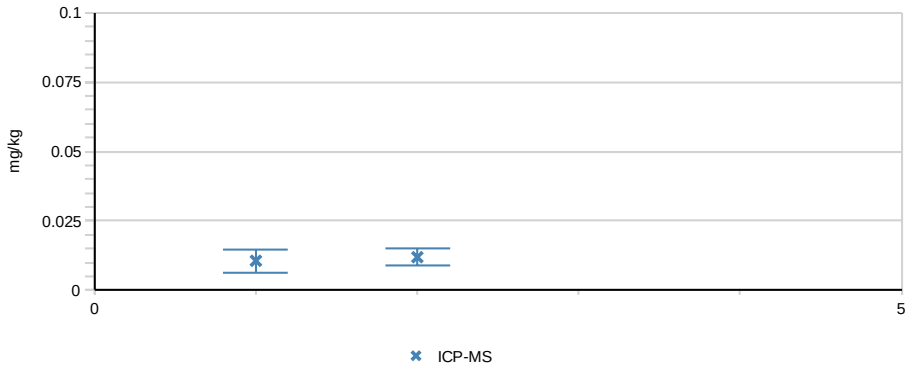



Measurand Ni Sample LT1F6
0.004
0.003
0.002
0.001
0
mg/kg
0
5
ICP-OES
ICP-MS

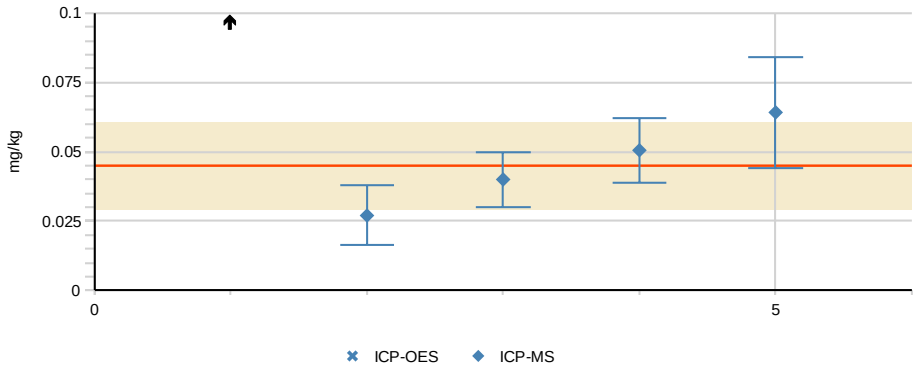

Measurand Ni Sample LT1F7
0.01
0.0075
0.005
0.0025
0
mg/kg
0
5
ICP-OES
ICP-MS


Measurand Ni Sample LT1LS_2
0.02
0.015
0.01
0.005
0
mg/kg
0
5
ICP-MS

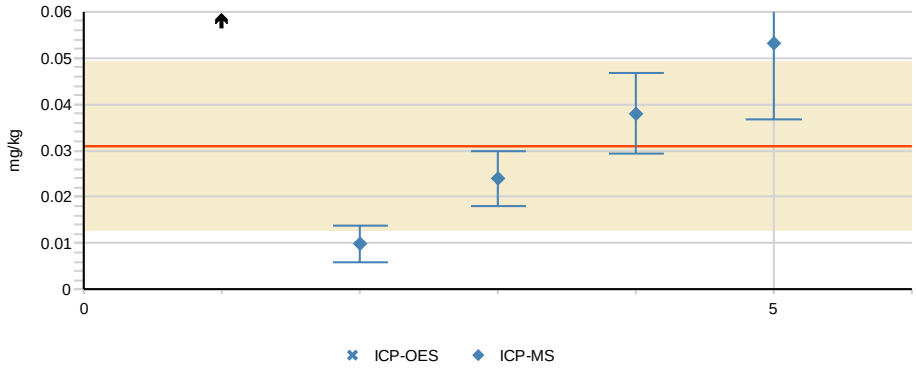
Measurand Ni Sample LT1LS10



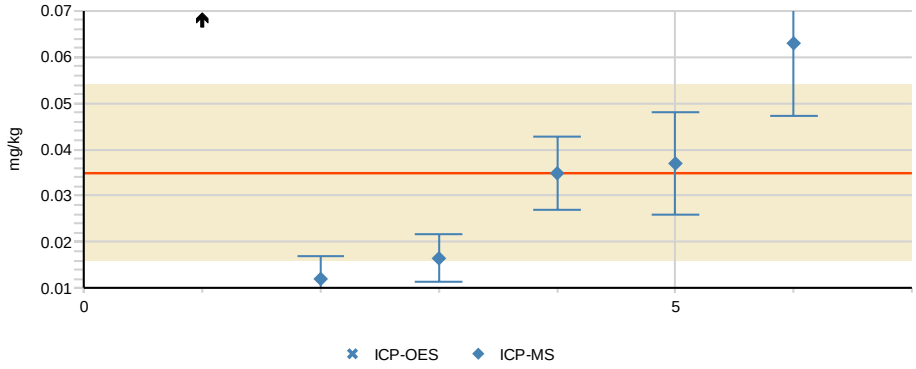
Measurand Pb Sample LT1F1



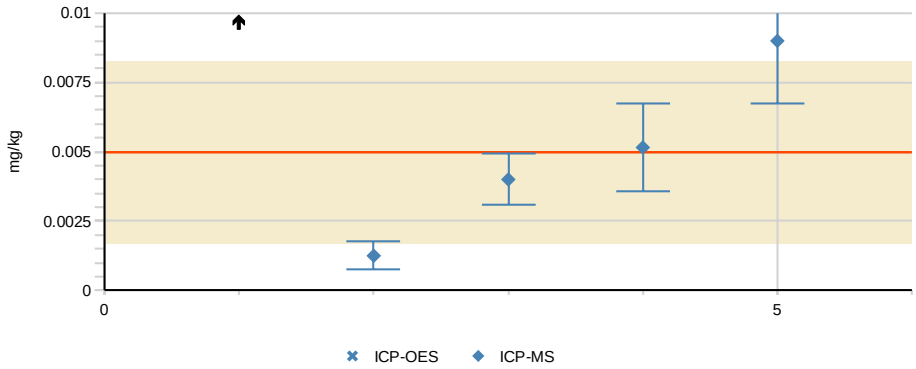
Measurand Pb Sample LT1F2



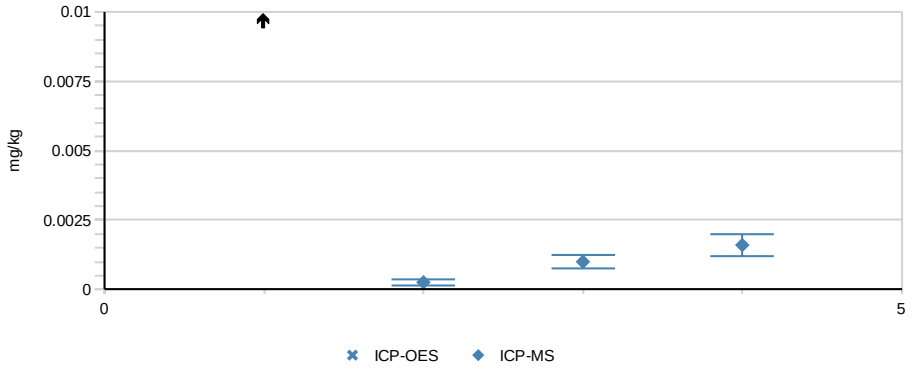
Measurand Pb Sample LT1F3



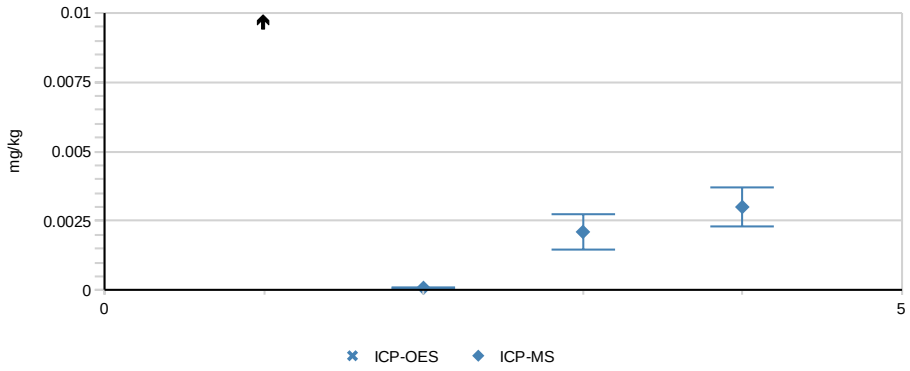
Measurand Pb Sample LT1F4



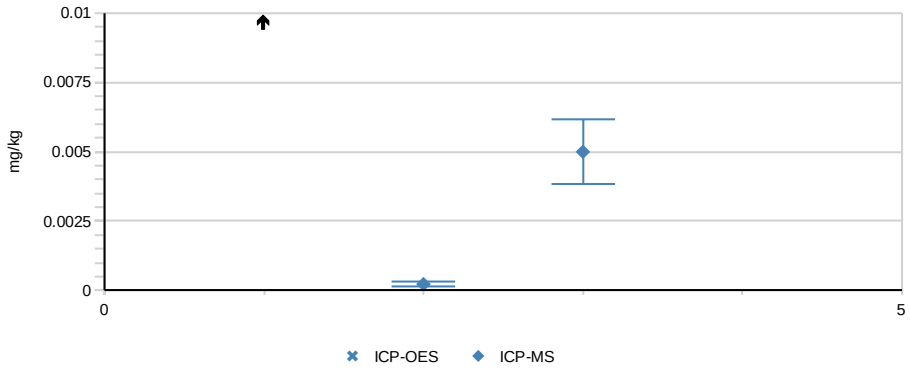
Measurand Pb Sample LT1F5



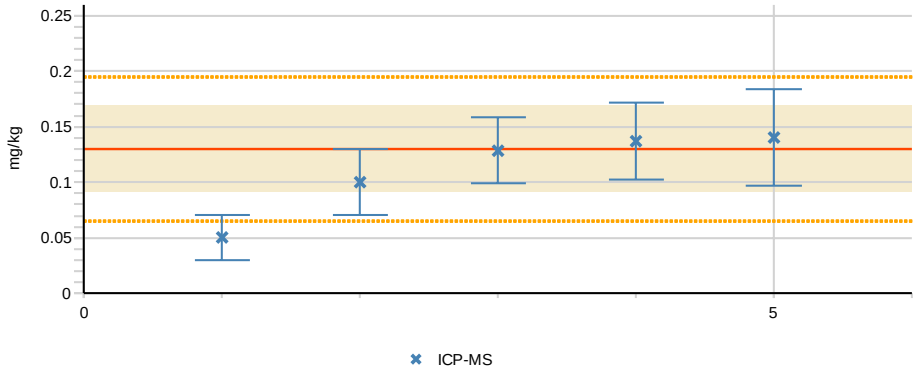
Measurand Pb Sample LT1F6



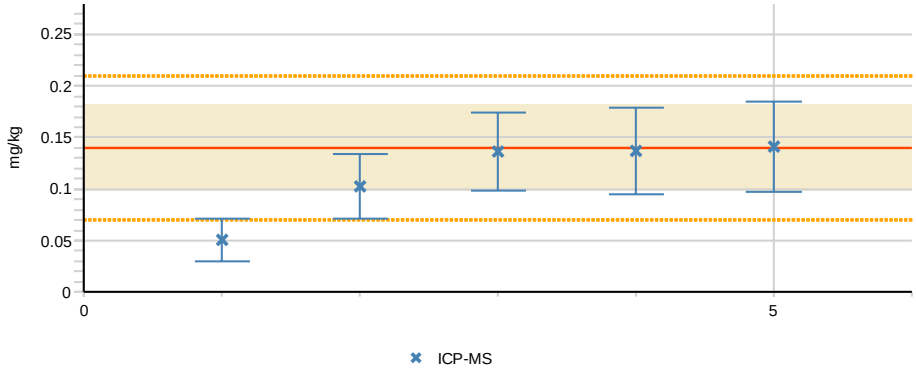
Measurand Pb Sample LT1F7



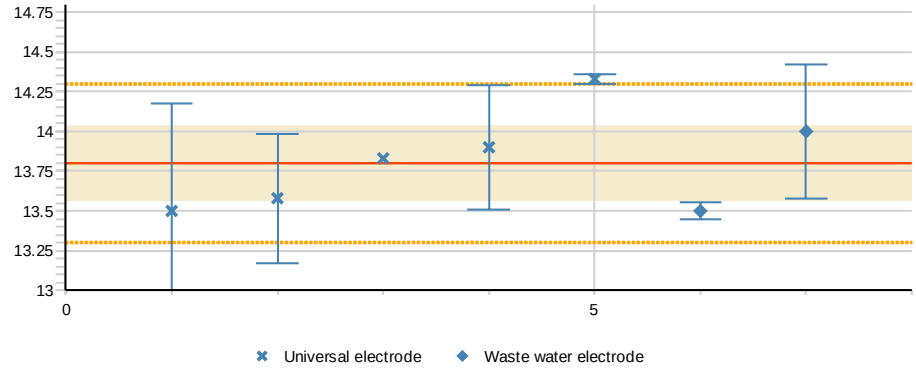
Measurand Pb Sample LT1LS_2



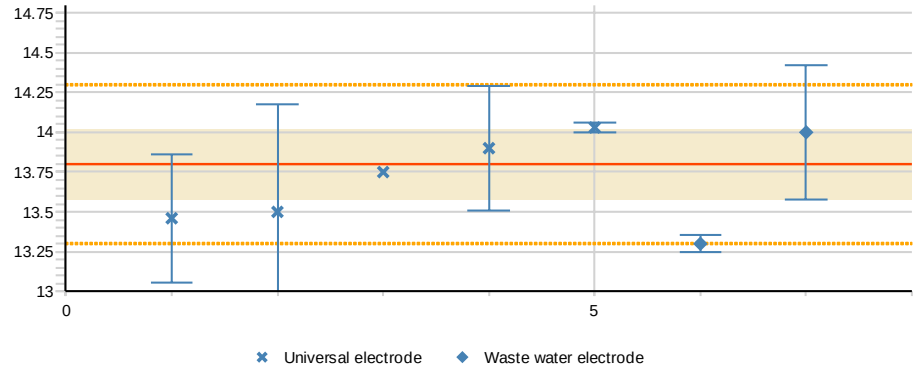
Measurand Pb Sample LT1LS10

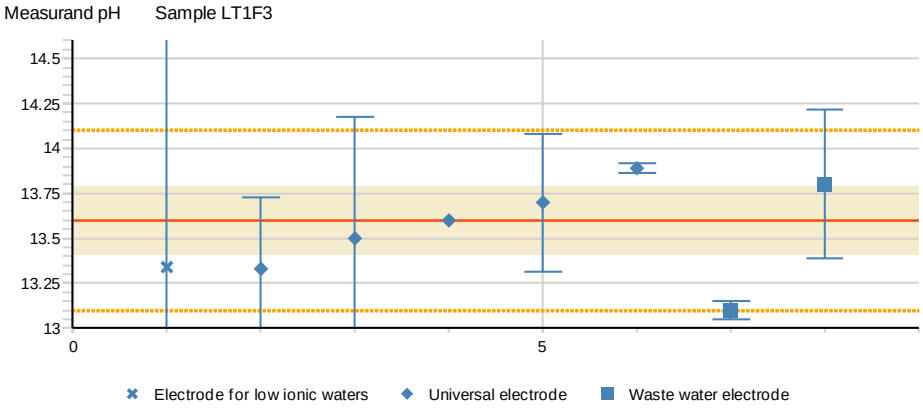


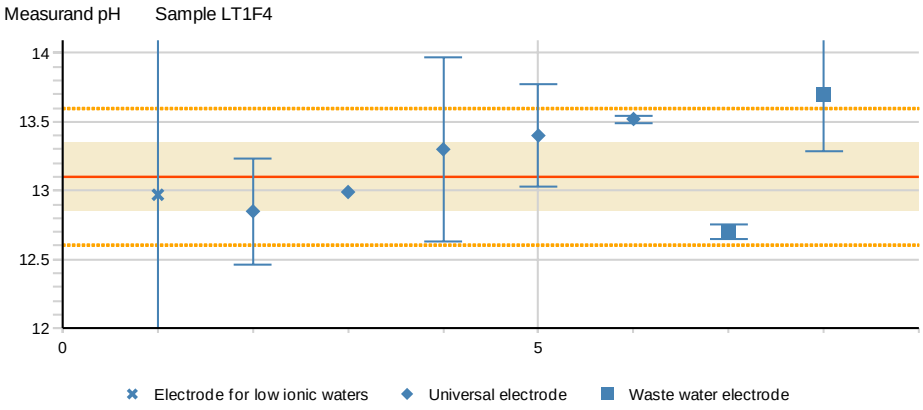
Measurand pH Sample LT1F1

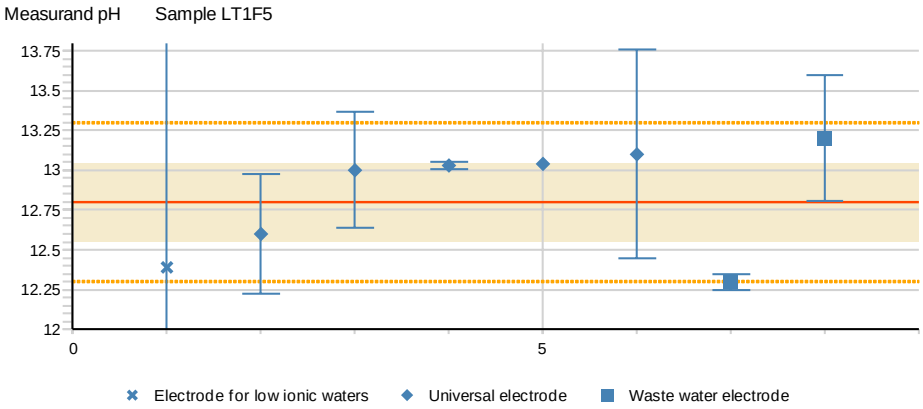


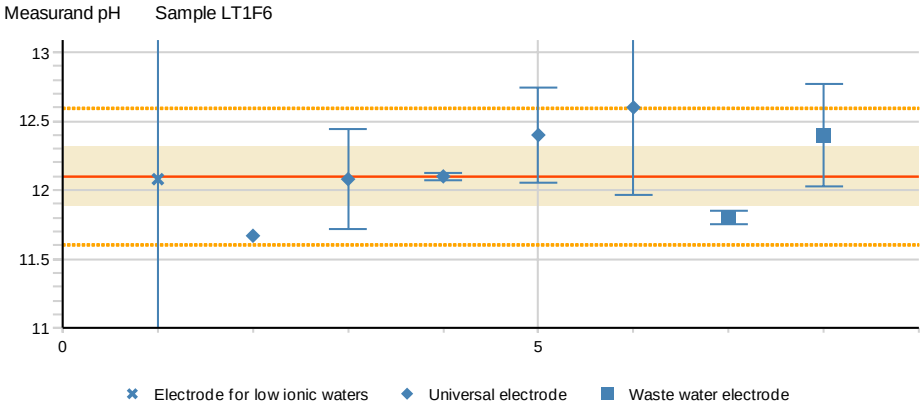
Measurand pH Sample LT1F2

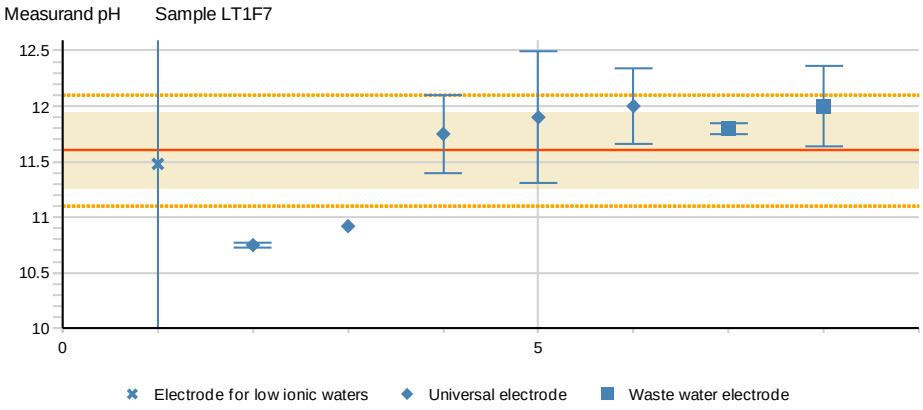


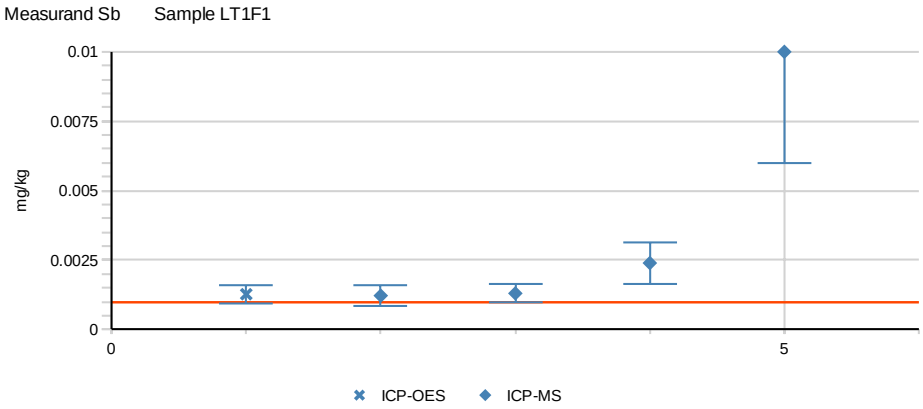

Measurand pH
Sample LT1F3
14.5
14.25
14
13.75
13.5
13.25
13
0
5
Electrode for low ionic waters
Universal electrode
Waste water electrode

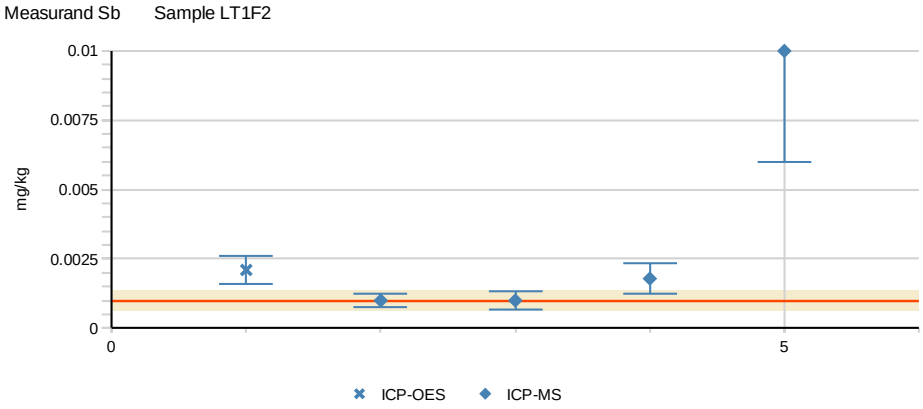

Measurand pH
Sample LT1F4
14
13.5
13
12.5
12
0
5
Electrode for low ionic waters
Universal electrode
Waste water electrode

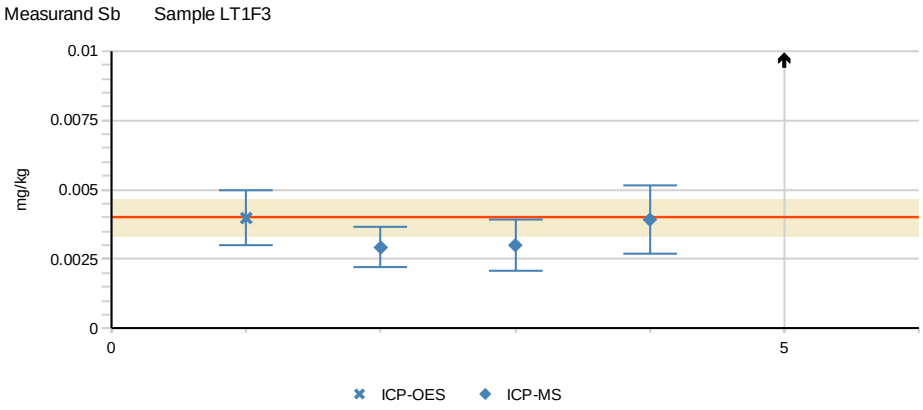

Measurand pH
Sample LT1F5
13.75
13.5
13.25
13
12.75
12.5
12.25
12
0
5
Electrode for low ionic waters
Universal electrode
Waste water electrode

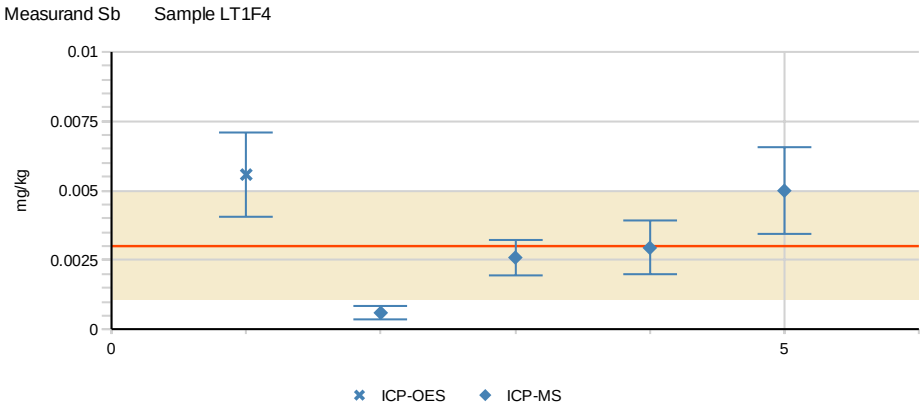

Measurand pH Sample LT1F6
13
12.5
12
11.5
11
0
5
Electrode for low ionic waters
Universal electrode
Waste water electrode

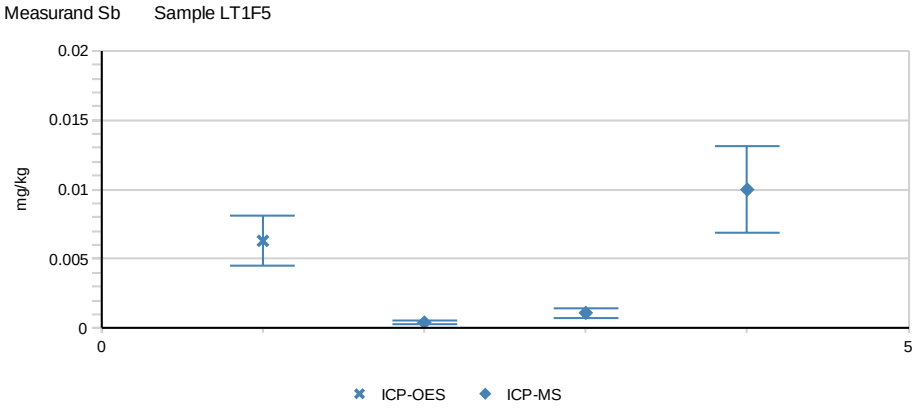

Measurand pH Sample LT1F7
12.5
12
11.5
11
10.5
10
0
5
Electrode for low ionic waters
Universal electrode
Waste water electrode

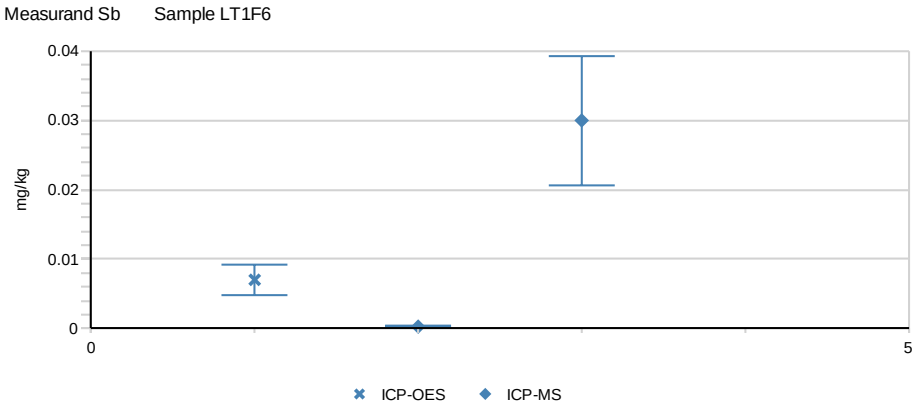

Measurand Sb Sample LT1F1
0.01
0.0075
0.005
0.0025
0
mg/kg
0
5
ICP-OES
ICP-MS

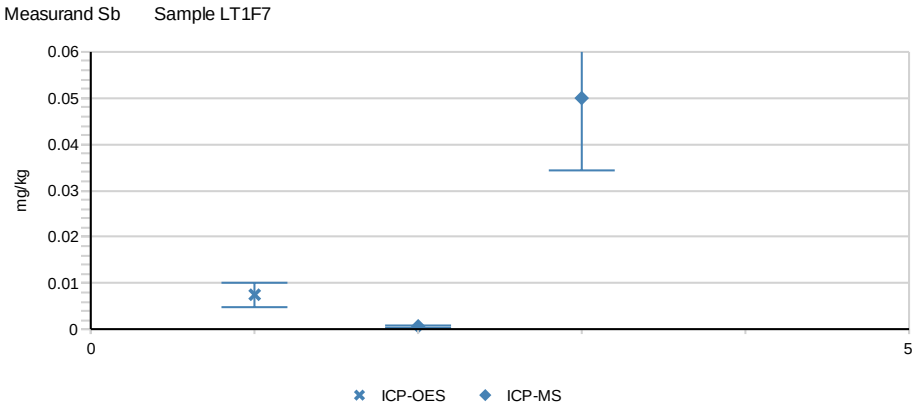

Measurand Sb
Sample LT1F2
0.01
0.0075
0.005
0.0025
0
mg/kg
0
5
ICP-OES
ICP-MS


Measurand Sb
Sample LT1F3
0.01
0.0075
0.005
0.0025
0
mg/kg
0
5
ICP-OES
ICP-MS

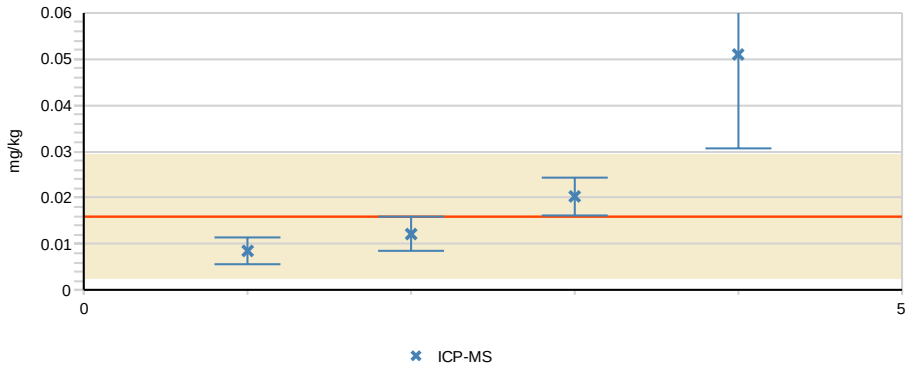

Measurand Sb
Sample LT1F4
0.01
0.0075
0.005
0.0025
0
mg/kg
0
5
ICP-OES
ICP-MS


Measurand Sb Sample LT1F5
0.02
0.015
0.01
0.005
0
mg/kg
0
5
ICP-OES
ICP-MS

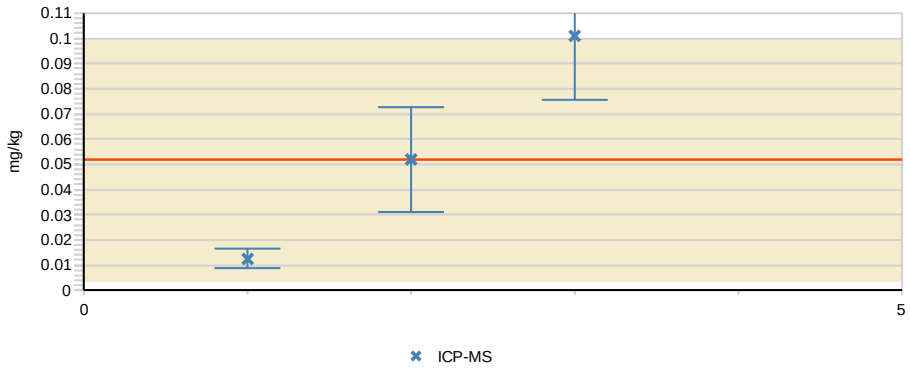

Measurand Sb Sample LT1F6
0.04
0.03
0.02
0.01
0
mg/kg
0
5
ICP-OES
ICP-MS


Measurand Sb Sample LT1F7
0.06
0.05
0.04
0.03
0.02
0.01
0
mg/kg
0
5
ICP-OES
ICP-MS

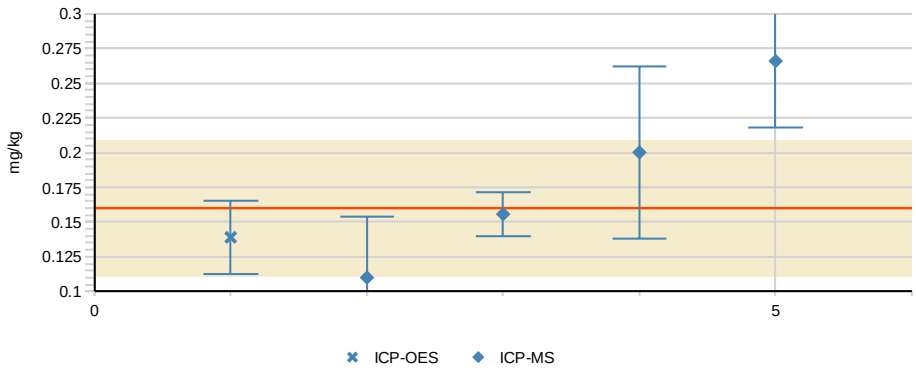
Measurand Sb Sample LT1LS_2

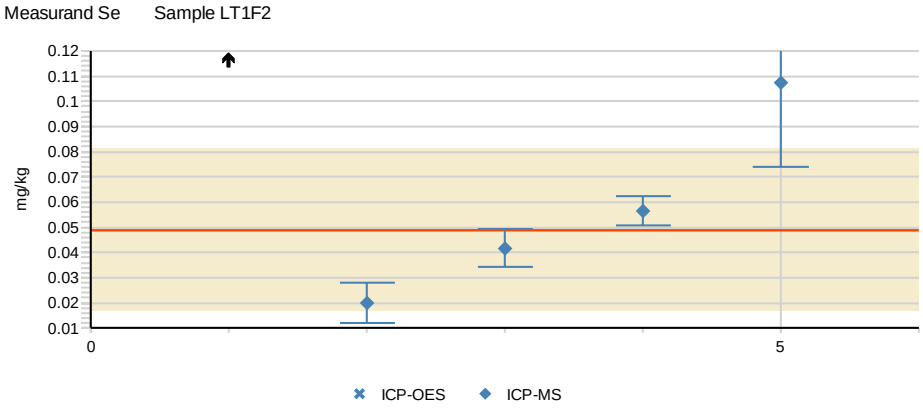


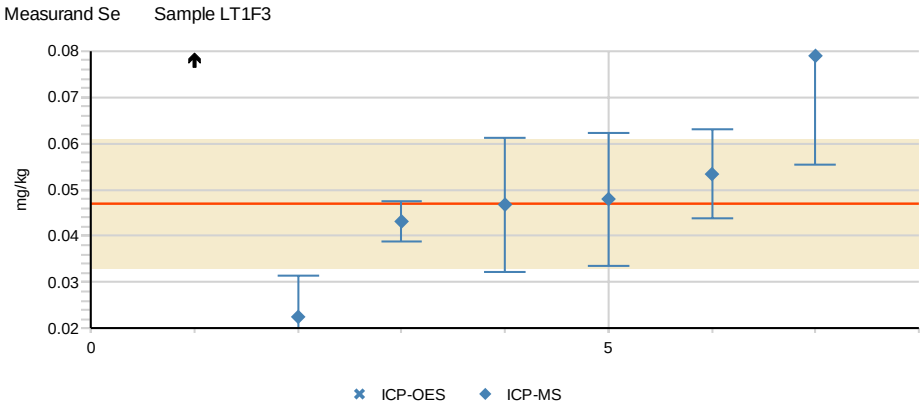
Measurand Sb Sample LT1LS10

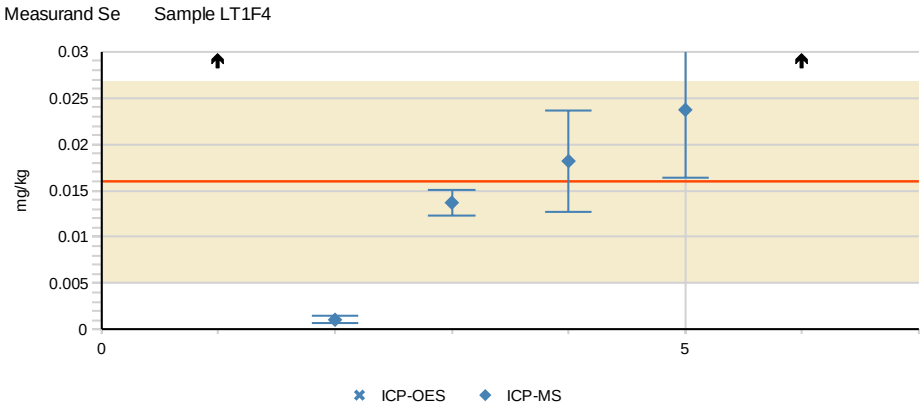


Measurand Se Sample LT1F1

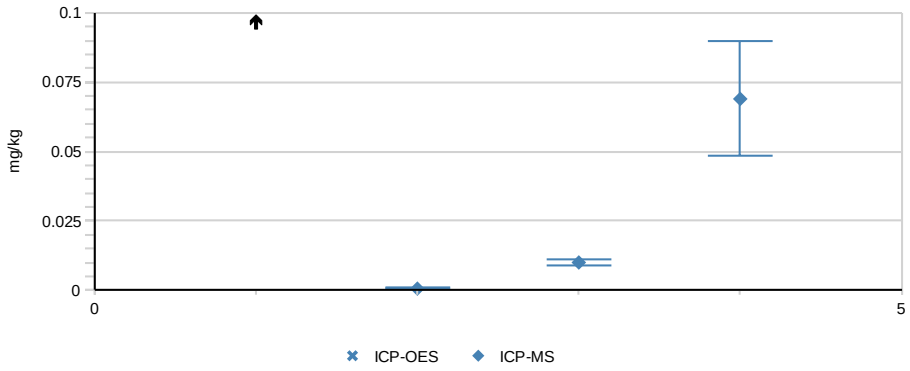



Measurand Se
Sample LT1F2
0.12
0.11
0.1
0.09
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
mg/kg
0
5
ICP-OES
ICP-MS

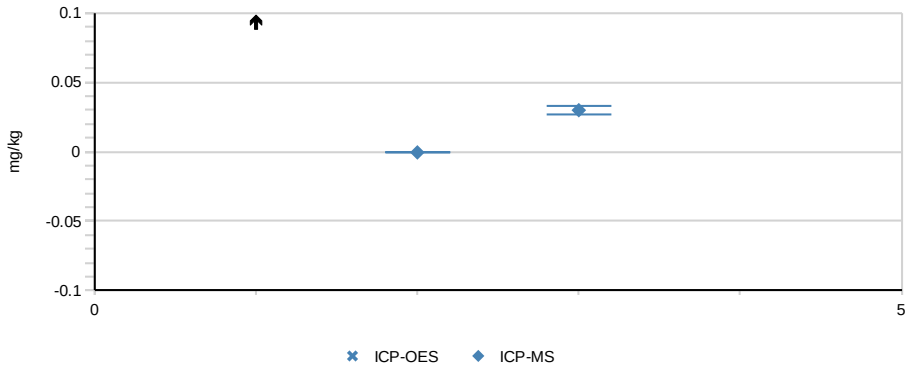

Measurand Se
Sample LT1F3
0.08
0.07
0.06
0.05
0.04
0.03
0.02
mg/kg
0
5
ICP-OES
ICP-MS


Measurand Se
Sample LT1F4
0.03
0.025
0.02
0.015
0.01
0.005
0
mg/kg
0
5
ICP-OES
ICP-MS

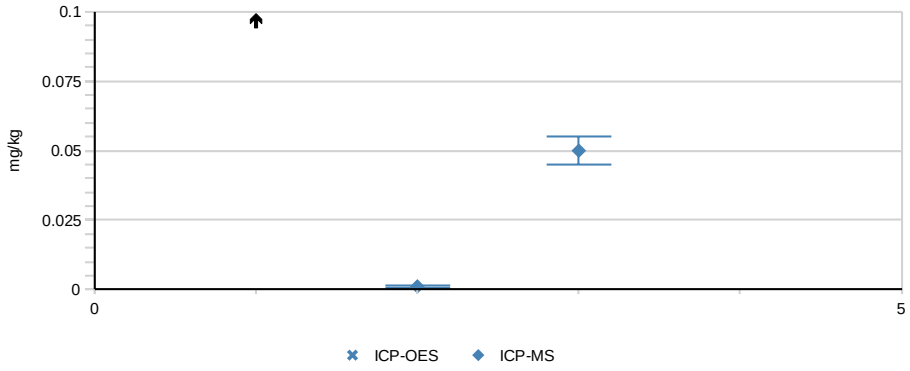
Measurand Se Sample LT1F5



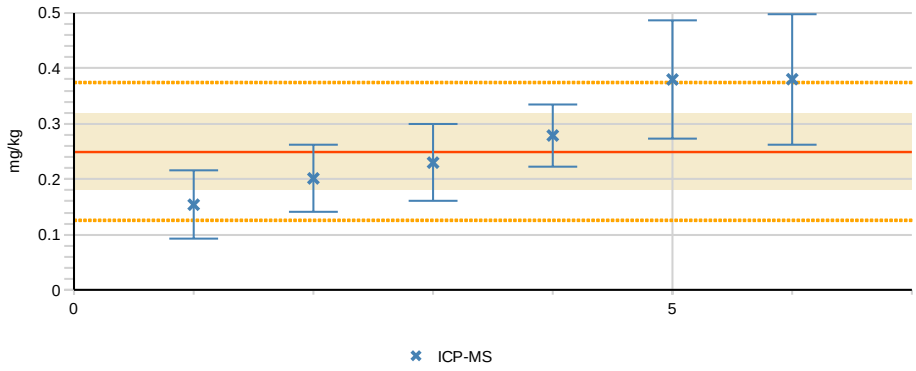
Measurand Se Sample LT1F6



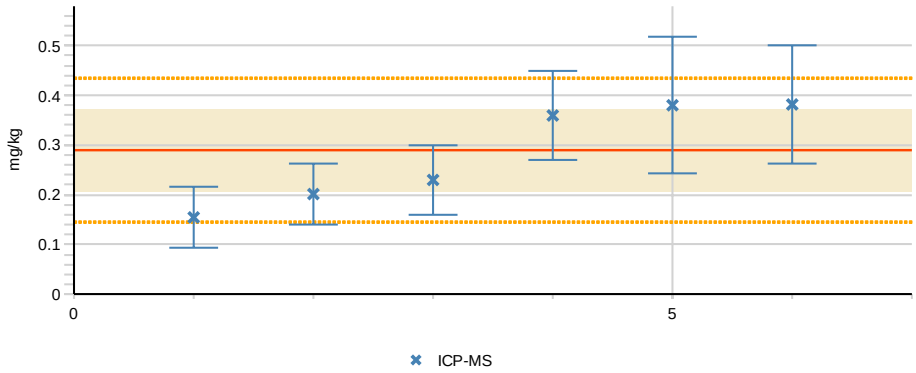
Measurand Se Sample LT1F7



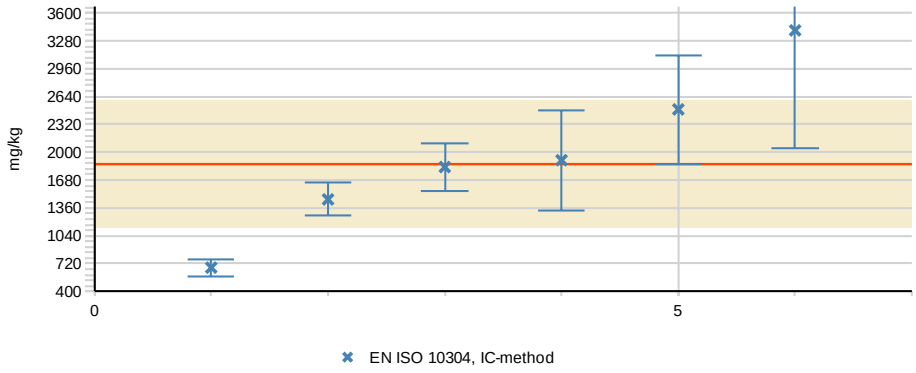
Measurand Se Sample LT1LS_2



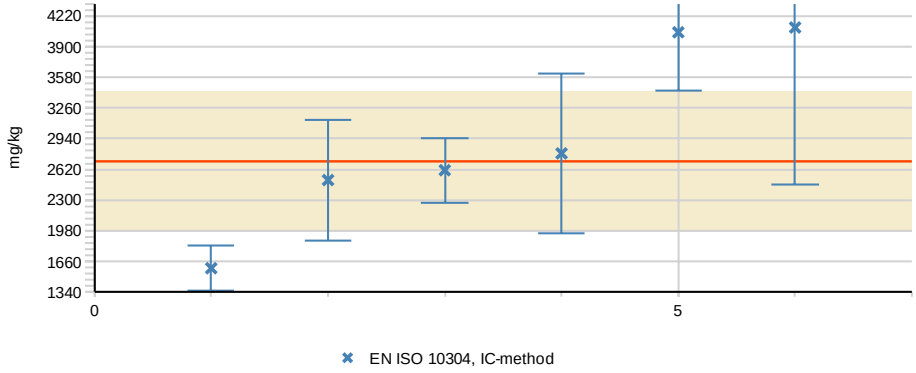
Measurand Se Sample LT1LS10



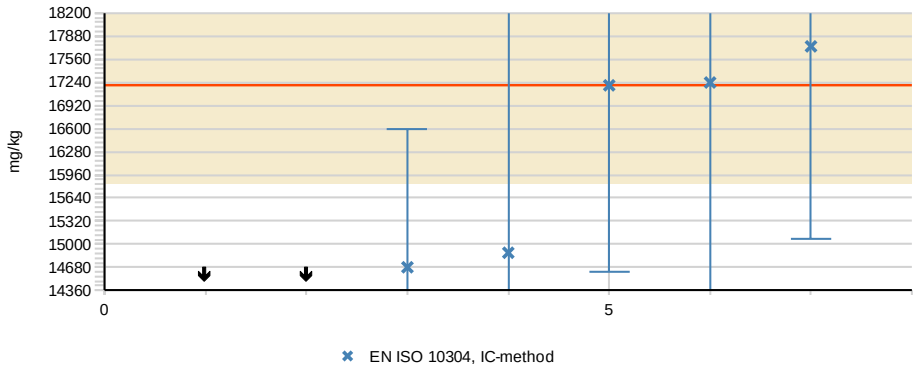
Measurand SO_4 Sample LT1F1



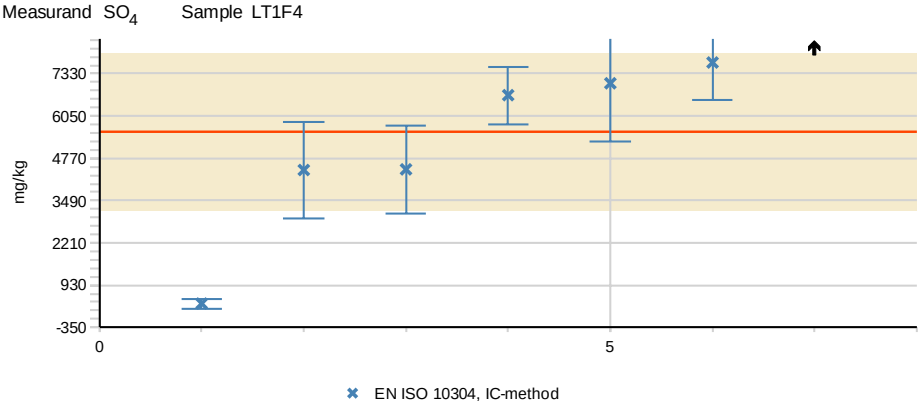
Measurand SO_4 Sample LT1F2

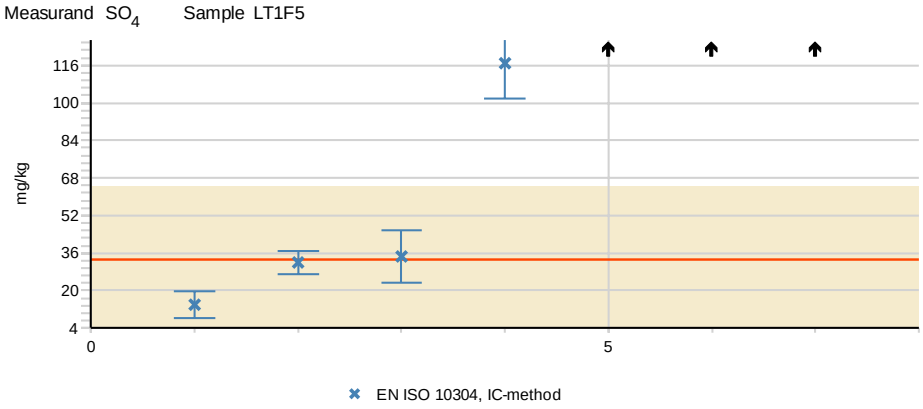


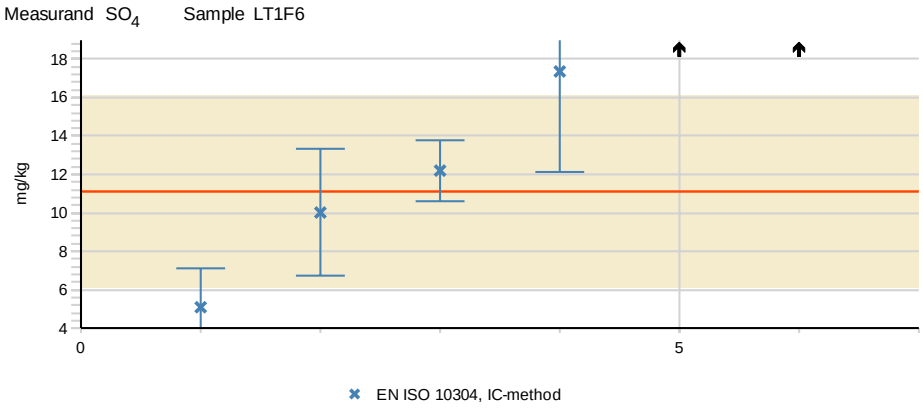
Measurand SO_4 Sample LT1F3

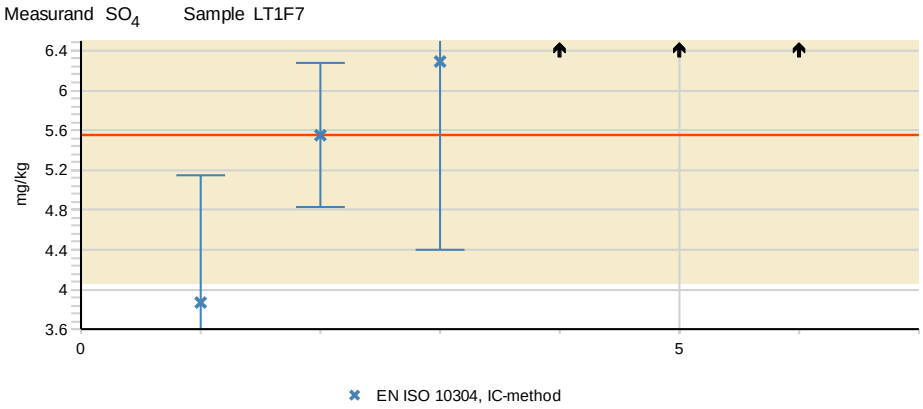


Measurand SO_4 Sample LT1F4

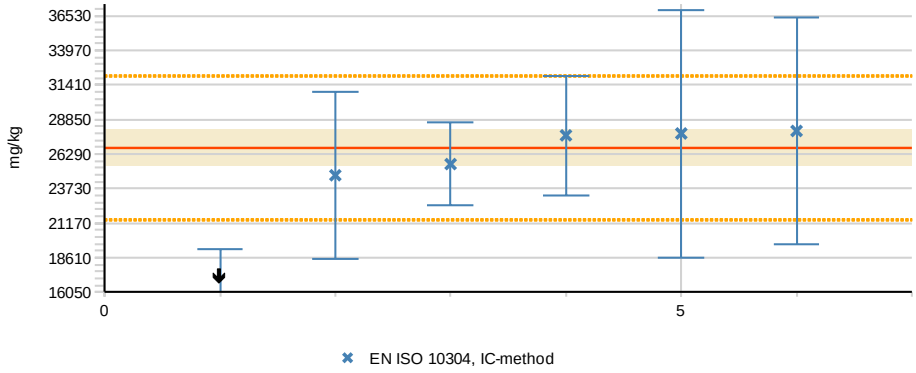



Measurand SO4
Sample LT1F5
mg/kg
116
100
84
68
52
36
20
4
0
5
EN ISO 10304, IC-method

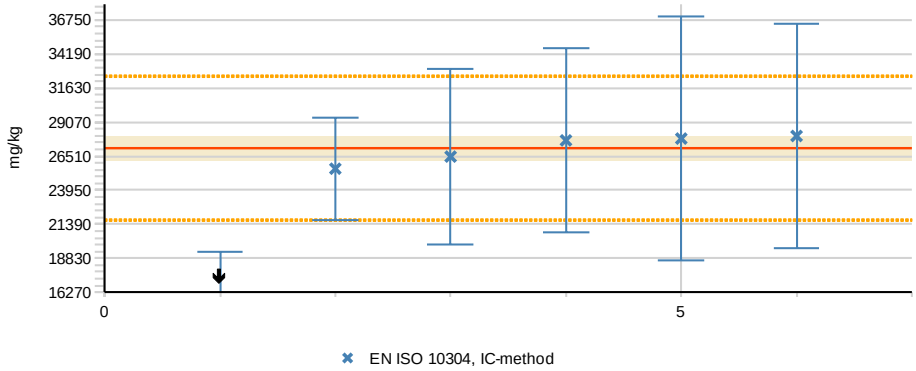

Measurand SO4
Sample LT1F6
mg/kg
18
16
14
12
10
8
6
4
0
5
EN ISO 10304, IC-method


Measurand SO4
Sample LT1F7
mg/kg
6.4
6
5.6
5.2
4.8
4.4
4
3.6
0
5
EN ISO 10304, IC-method

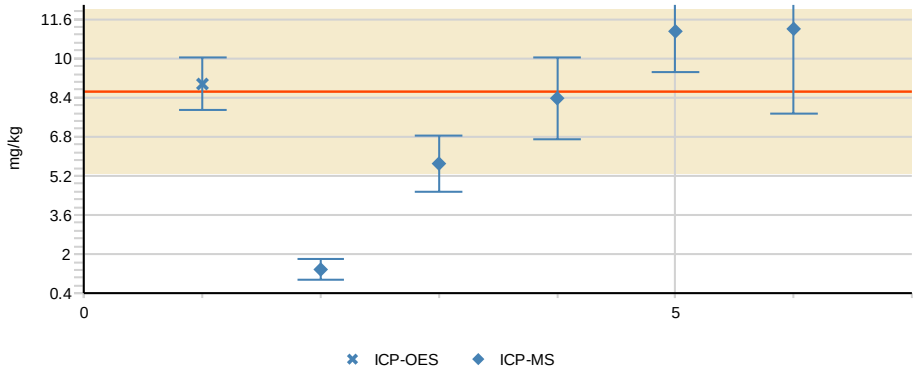
Measurand SO_4 Sample LT1LS_2

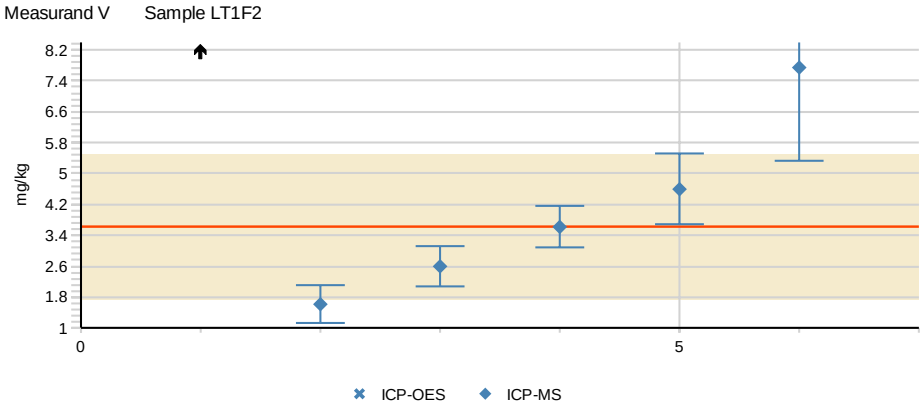


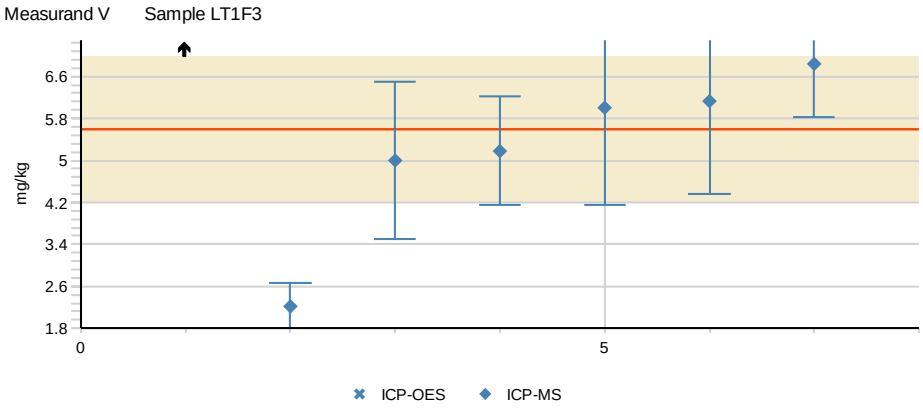
Measurand SO_4 Sample LT1LS10

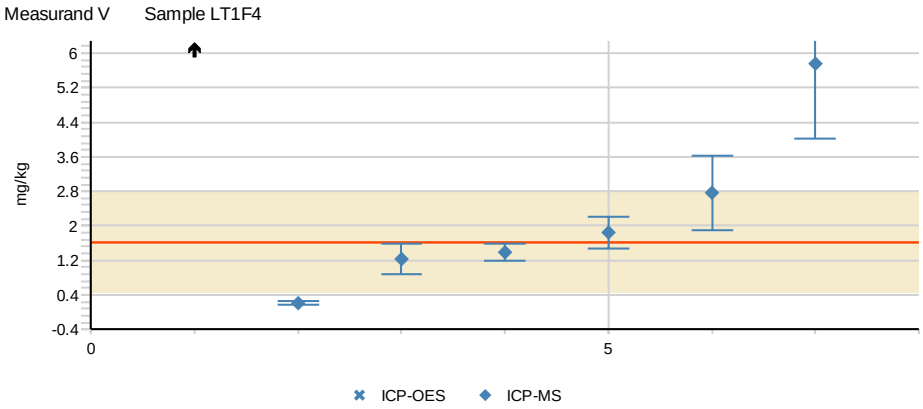


Measurand V Sample LT1F1

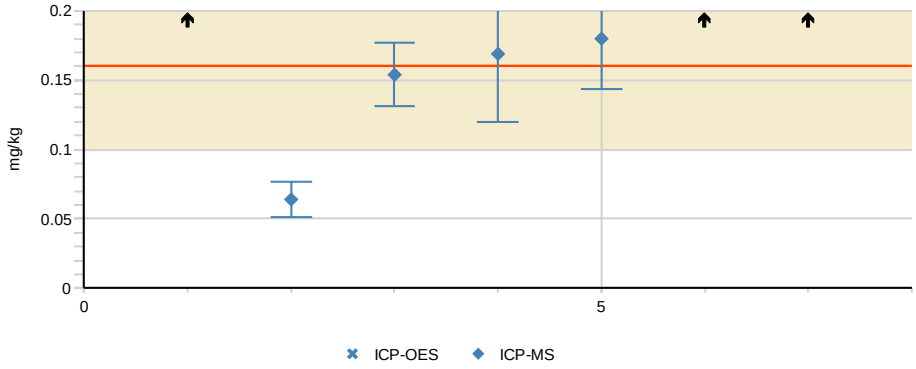



Measurand V
Sample LT1F2
8.2
7.4
6.6
5.8
5
4.2
3.4
2.6
1.8
1
mg/kg
0
5
ICP-OES
ICP-MS

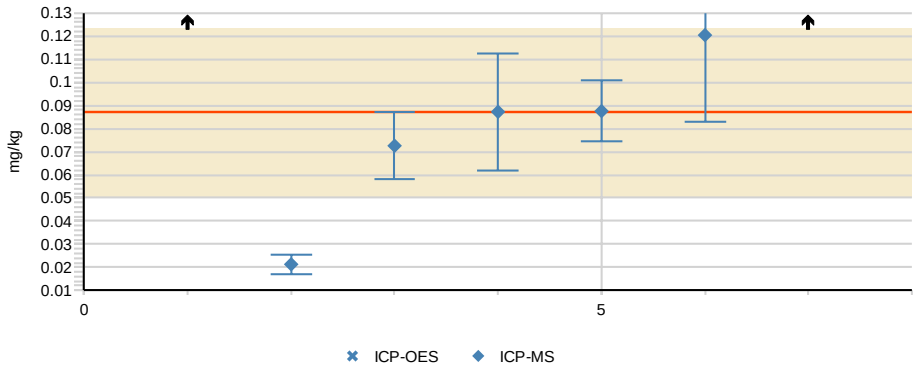

Measurand V
Sample LT1F3
6.6
5.8
5
4.2
3.4
2.6
1.8
mg/kg
0
5
ICP-OES
ICP-MS


Measurand V
Sample LT1F4
6
5.2
4.4
3.6
2.8
2
1.2
0.4
-0.4
mg/kg
0
5
ICP-OES
ICP-MS

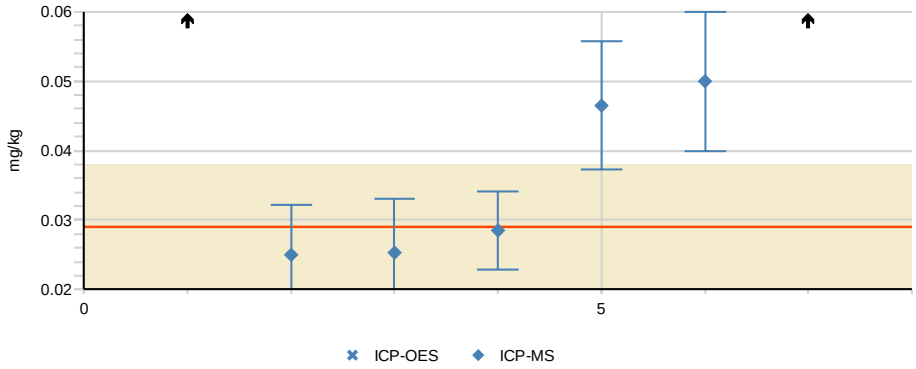
Measurand V Sample LT1F5



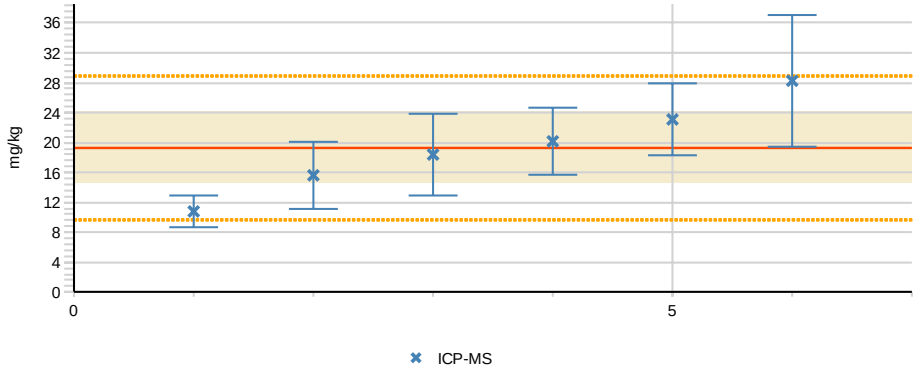
Measurand V Sample LT1F6



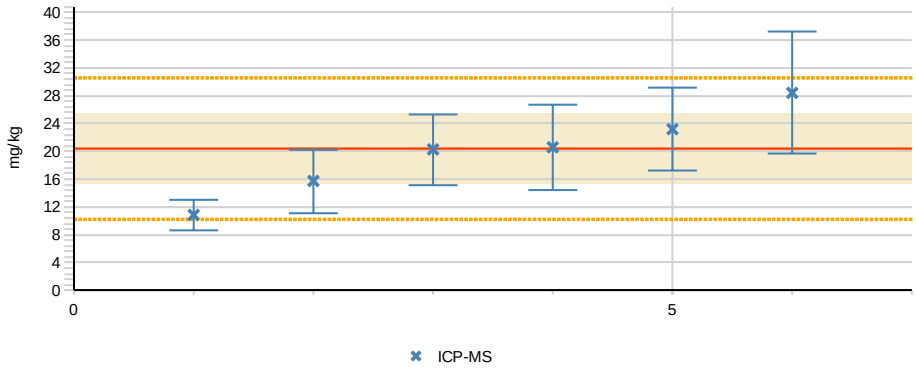
Measurand V Sample LT1F7



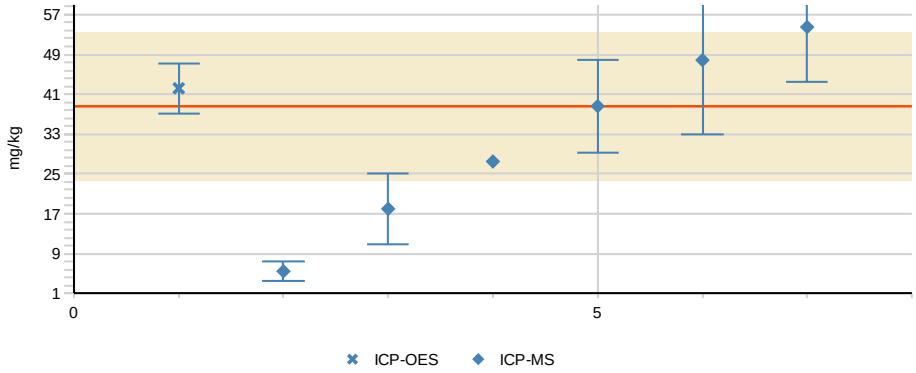
Measurand V Sample LT1LS_2



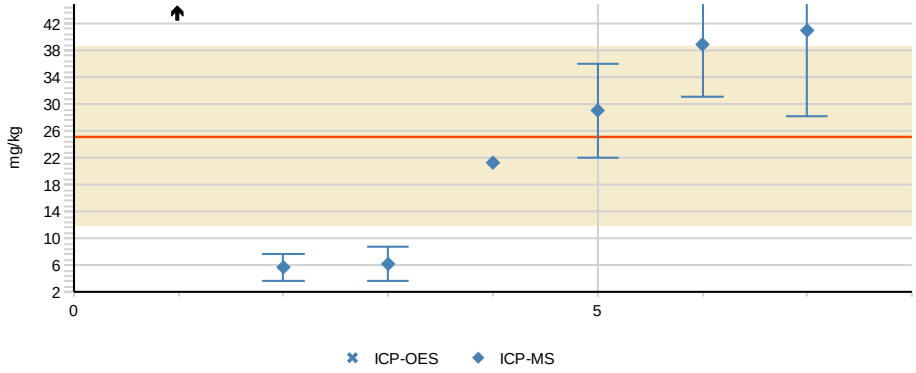
Measurand V Sample LT1LS10



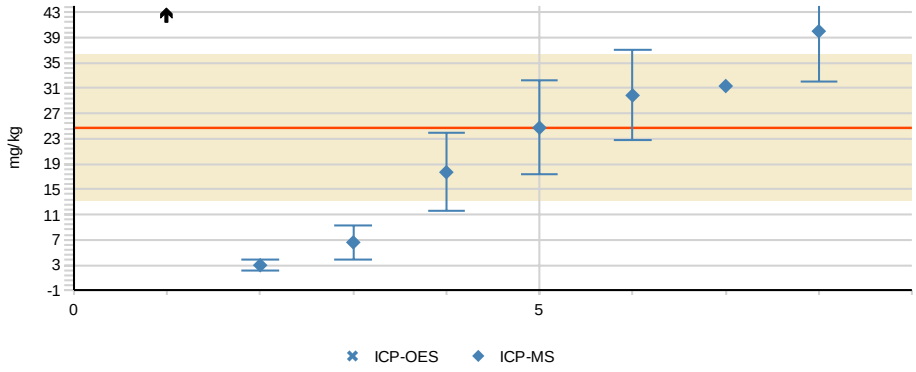
Measurand Zn Sample LT1F1



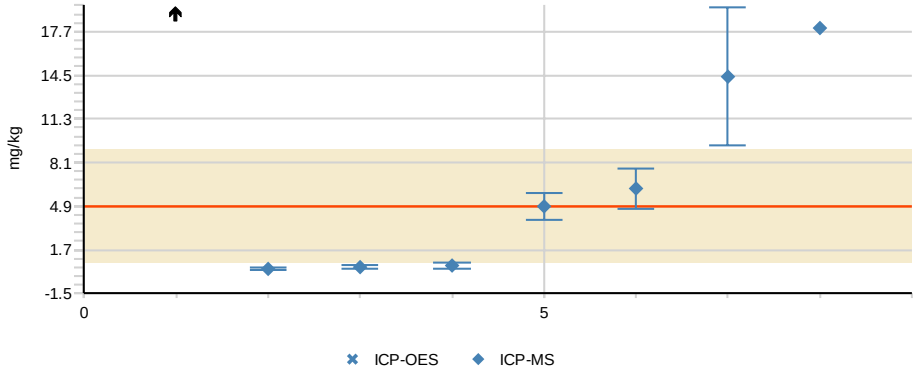
Measurand Zn Sample LT1F2



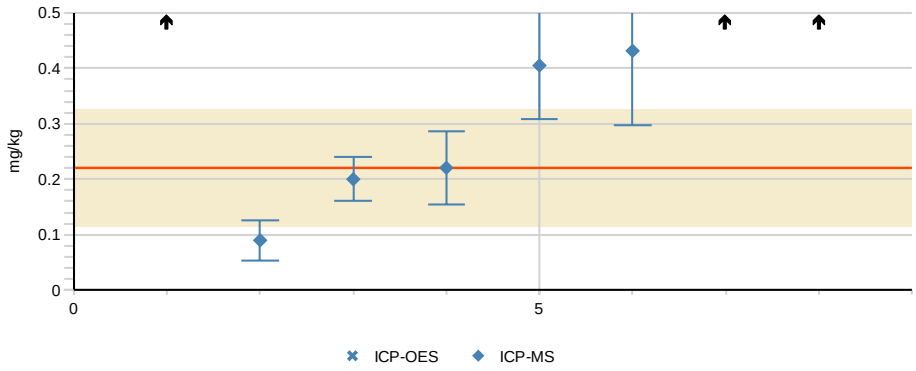
Measurand Zn Sample LT1F3



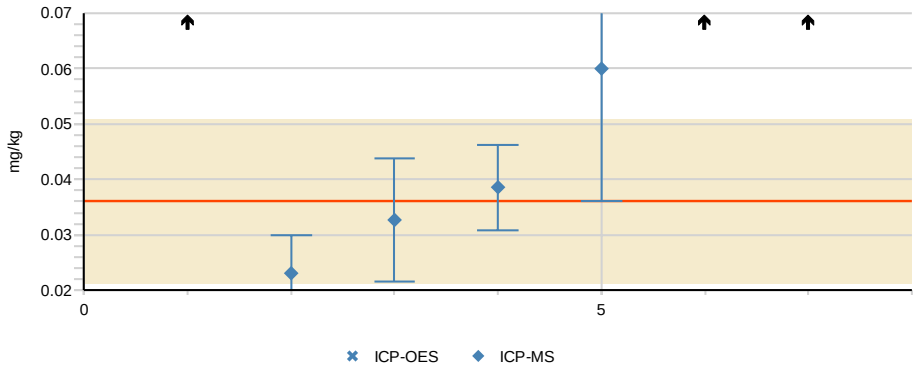
Measurand Zn Sample LT1F4



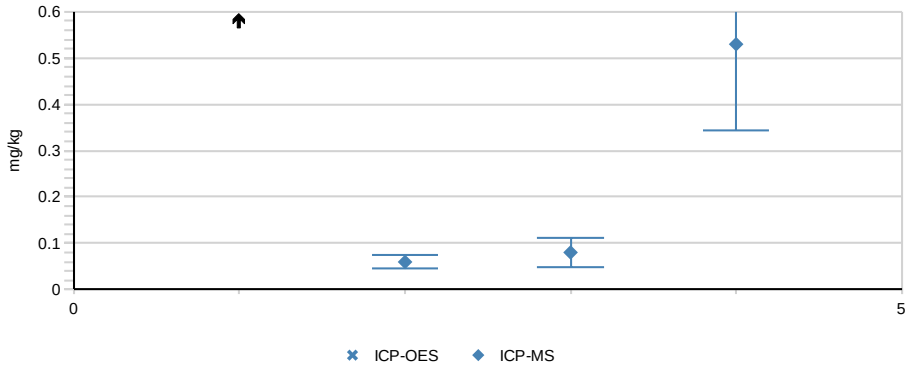
Measurand Zn Sample LT1F5



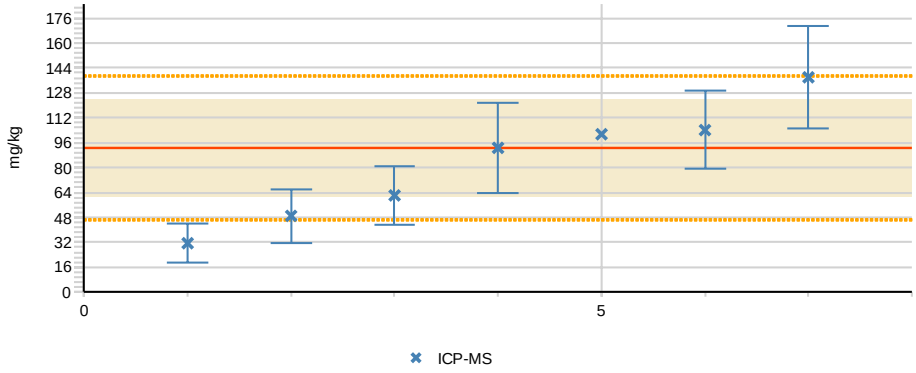
Measurand Zn Sample LT1F6



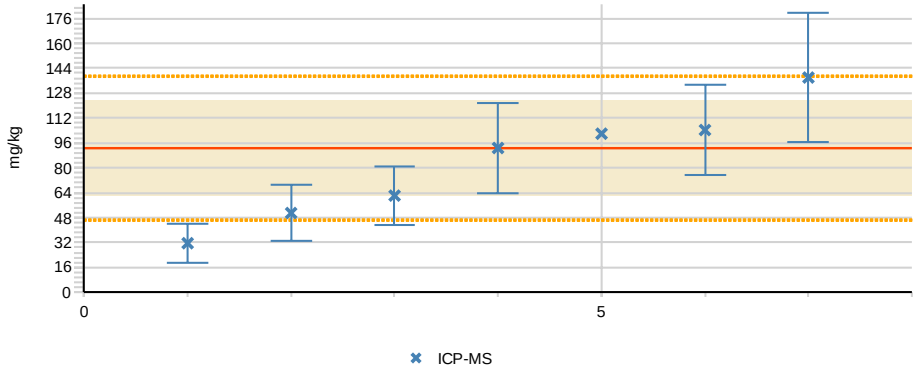
Measurand Zn Sample LT1F7



Measurand Zn Sample LT1LS_2

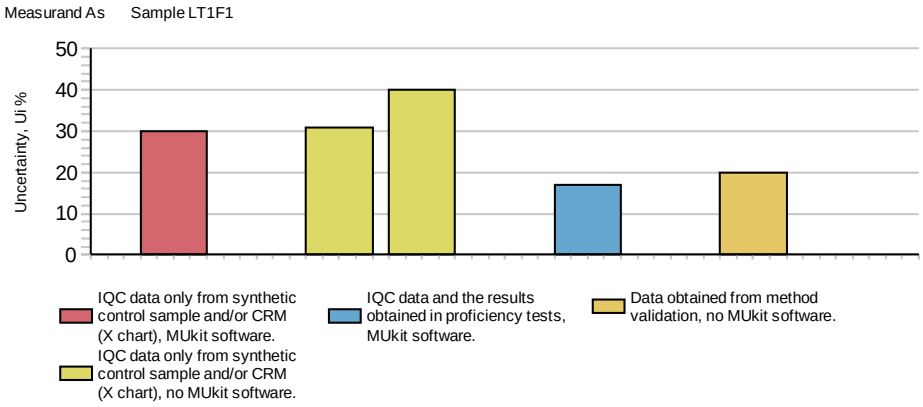


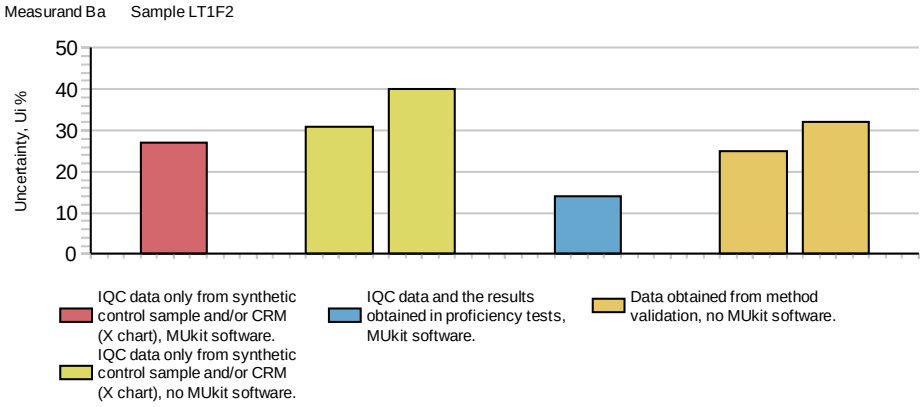
Measurand Zn Sample LT1LS10



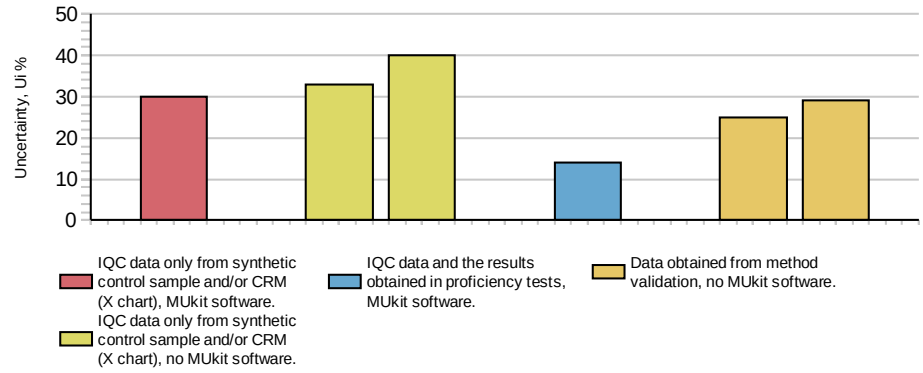
APPENDIX 13: Examples of measurement uncertainties reported by the participants

In figures, the presented expanded measurement uncertainties are grouped according to the method of estimation at 95 % confidence level (k=2). The expanded uncertainties were estimated mainly by using the internal quality control (IQC) data. The used procedures in figures below are distinguished e.g. between using or not using the MUkit software for uncertainty estimation [9, 10] or using method validation [10].

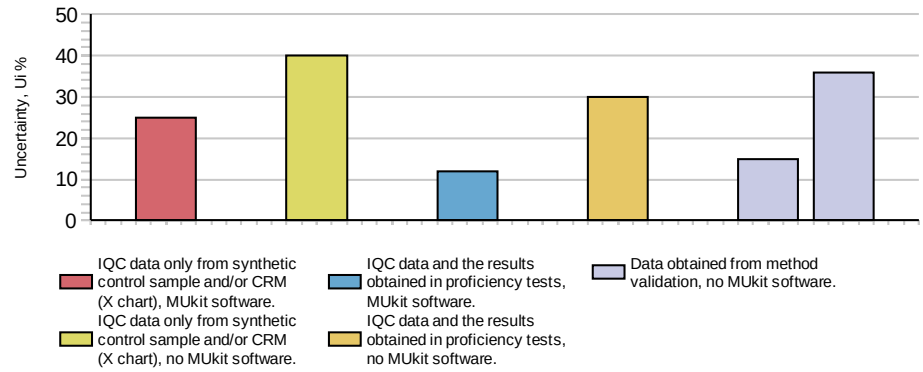




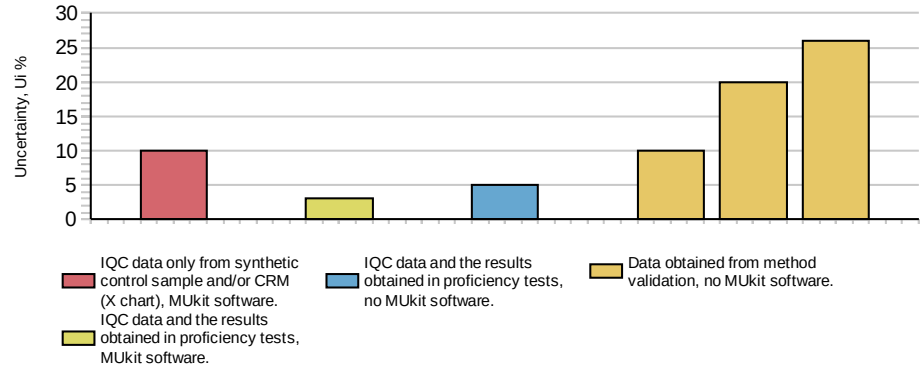
Measurand Cd Sample LT1F3



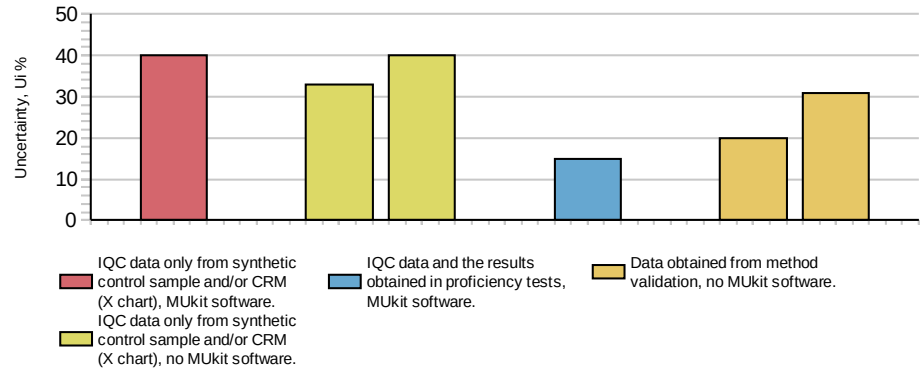
Measurand Cl Sample LT1F4



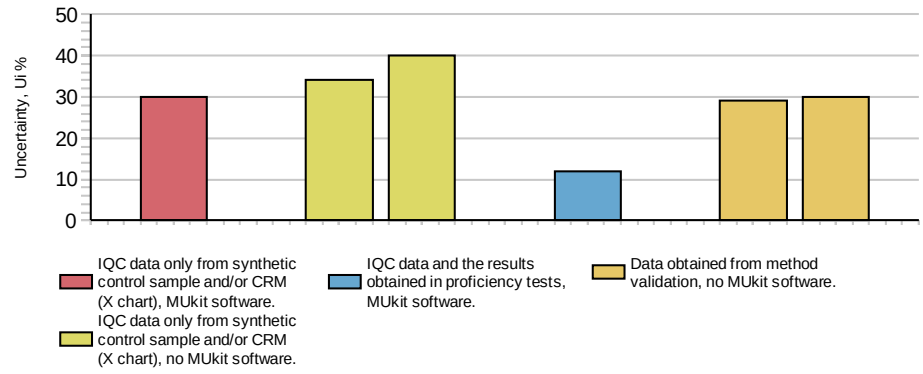
Measurand Conductivity 25 Sample LT1F5



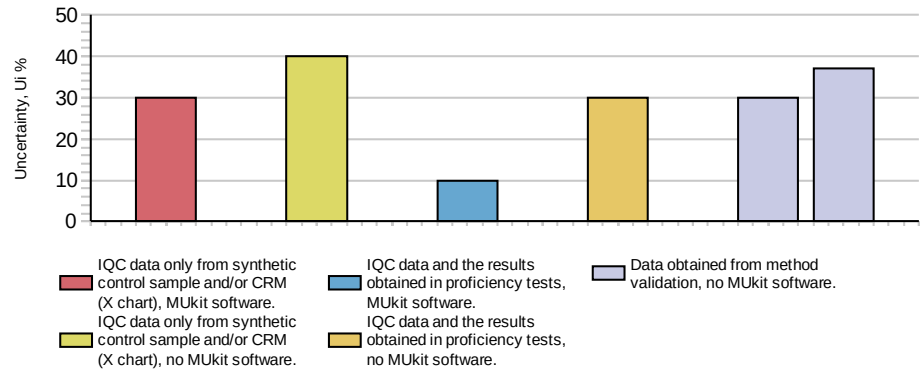
Measurand Cr Sample LT1F6



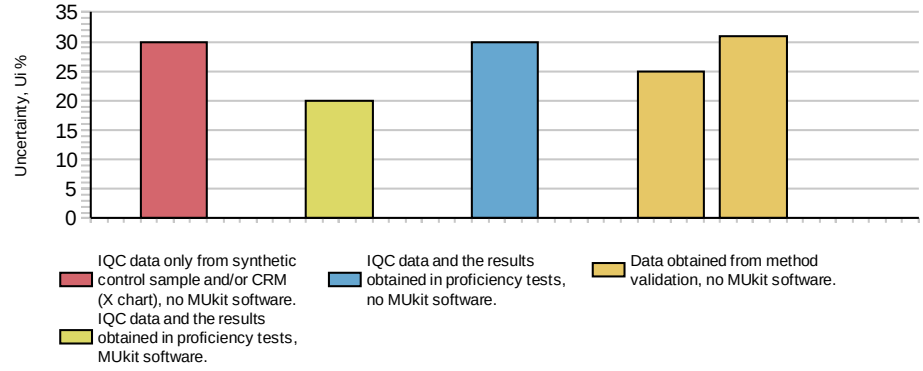
Measurand Cu Sample LT1F7



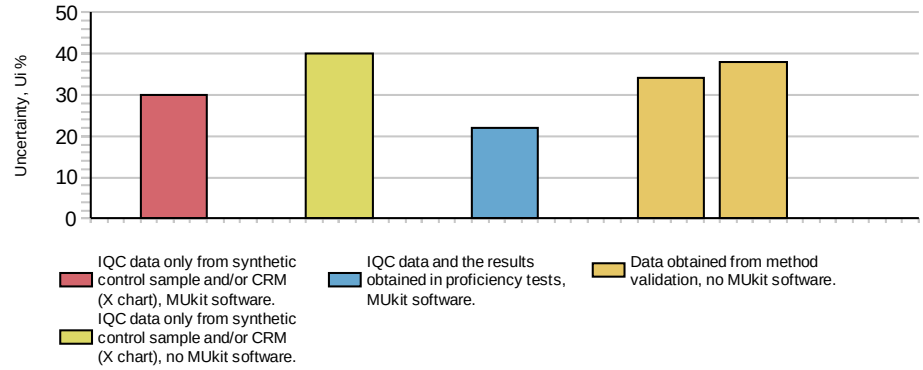
Measurand DOC Sample LT1F7



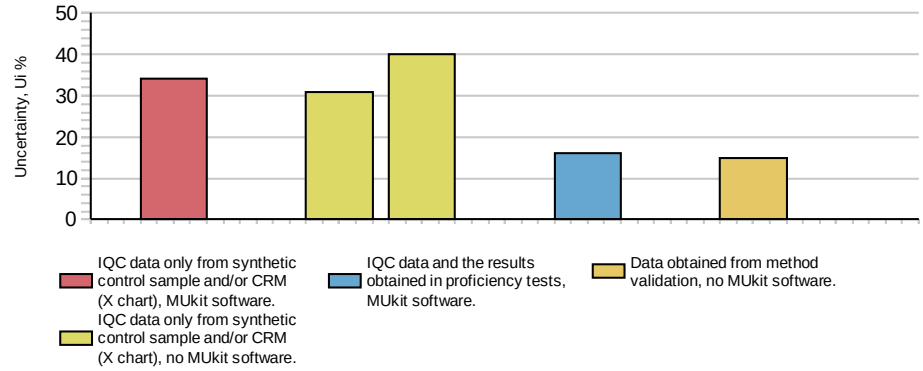
Measurand F Sample LT1LS_2



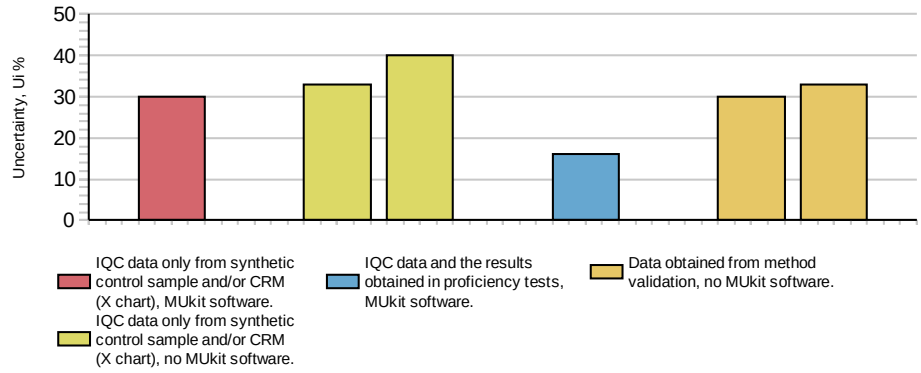
Measurand Hg Sample LT1LS10



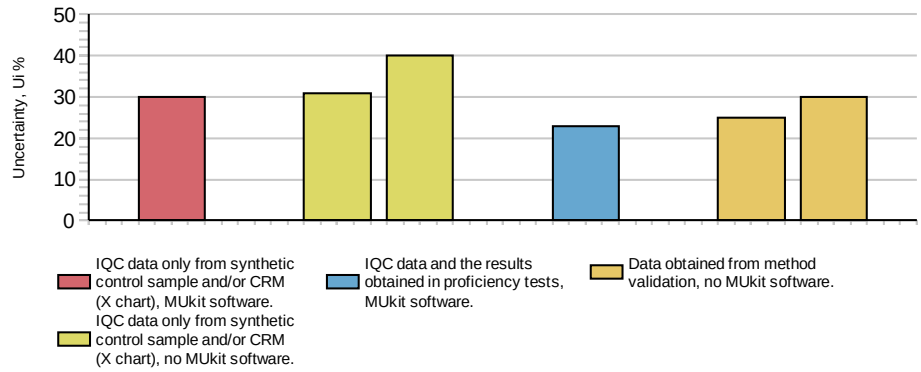
Measurand Mo Sample LT1F1



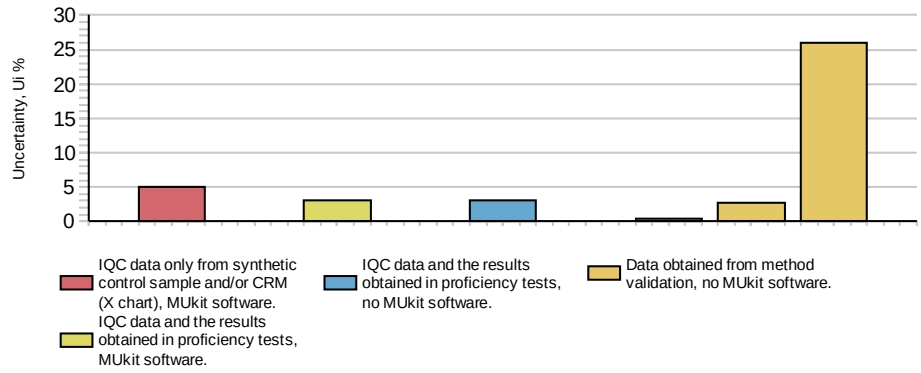
Measurand Ni Sample LT1F2



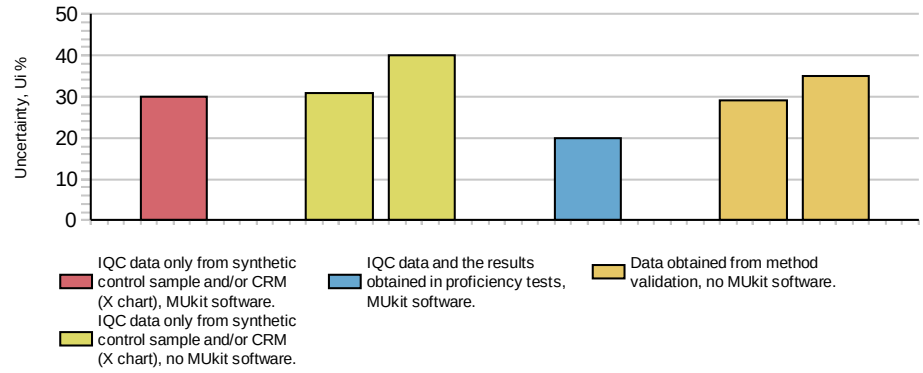
Measurand Pb Sample LT1F3



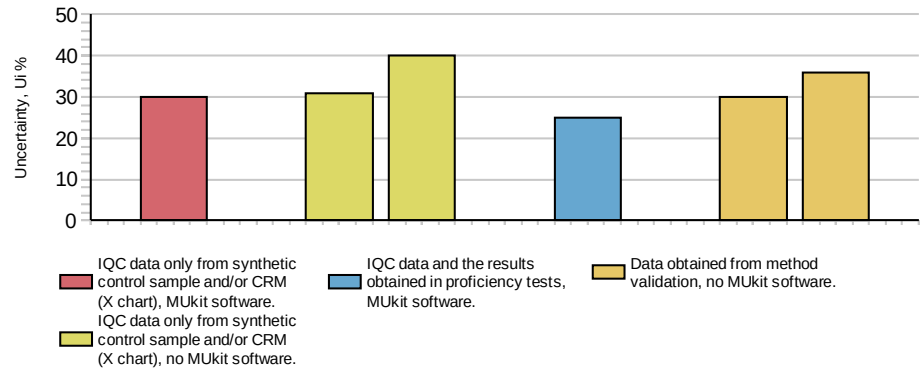
Measurand pH Sample LT1F4



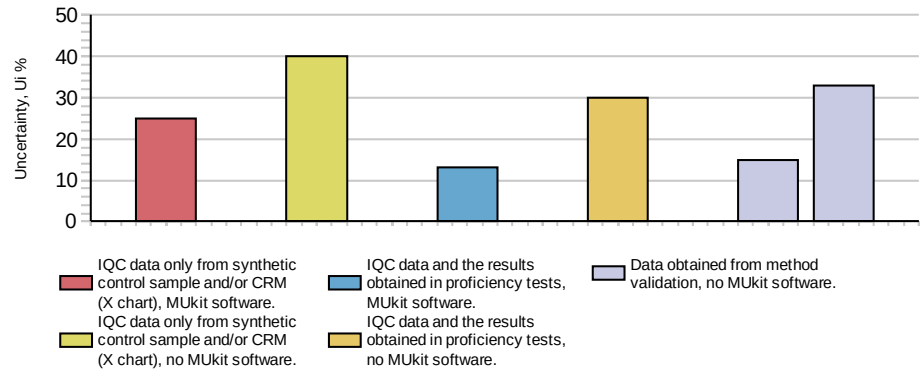
Measurand Sb Sample LT1LS_2

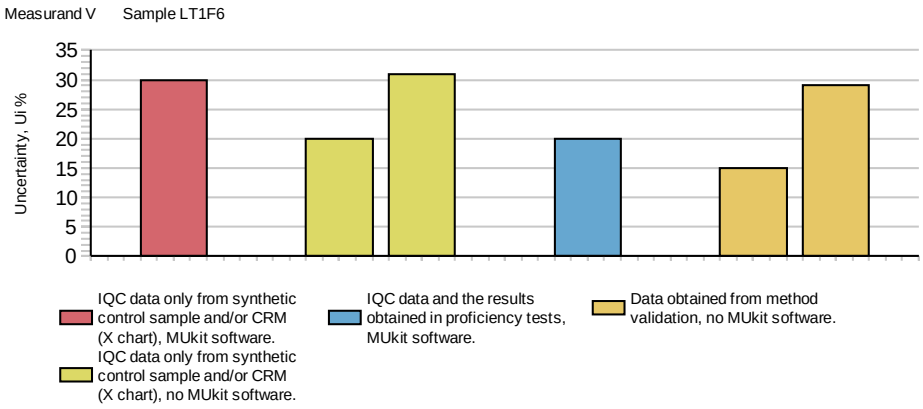


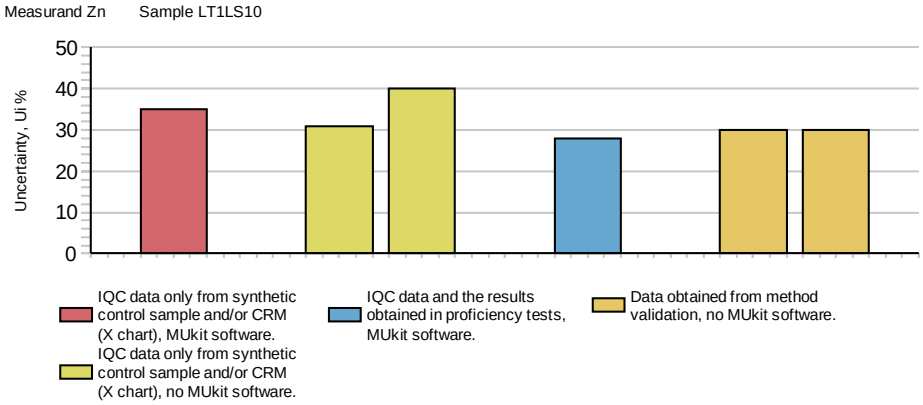
Measurand Se Sample LT1LS10



Measurand SO_4 Sample LT1F5




Measurand V
Sample LT1F6
Uncertainty, Ui %
35
30
25
20
15
10
5
0
IQC data only from synthetic control sample and/or CRM (X chart), MUkit software.
IQC data and the results obtained in proficiency tests, MUkit software.
Data obtained from method validation, no MUkit software.
IQC data only from synthetic control sample and/or CRM (X chart), no MUkit software.


Measurand Zn
Sample LT1LS10
Uncertainty, Ui %
50
40
30
20
10
0
IQC data only from synthetic control sample and/or CRM (X chart), MUkit software.
IQC data and the results obtained in proficiency tests, MUkit software.
Data obtained from method validation, no MUkit software.
IQC data only from synthetic control sample and/or CRM (X chart), no MUkit software.

INTERLABORATORY PROFICIENCY TEST SYKE 14/2017

FINNISH ENVIRONMENT INSTITUTE

ISBN 978-952-11-4949-8 (pbk.)
ISBN 978-952-11-4950-4 (PDF)
ISSN 1796-1718 (print)
ISSN 1796-1726 (Online)